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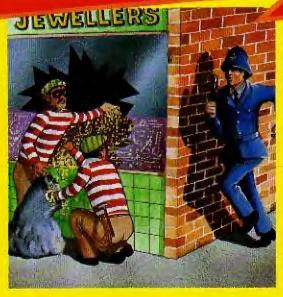






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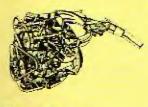


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Find your way around machine code programs with this useful utility. 40

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Internal combustion made plain courtesy of Electron animation.

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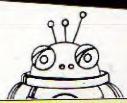
# Activities

Observation and association are tested in this educational program.

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### Published by Database Publications Ltd Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Telephone: 061-456 8835 (Editorial) 061-456 8383 (Administration) 061-456 8500 (Advertising) Subscriptions: 061-480 0171 Telex: 667664 SHARET G Prestel: 614568383.

News trade distribution: Europress Sales and Distribution Umited, 11 Brighton Road, Crawley, West Sussex RH10 6AF, Circulation 0293 27053.

Electron User is an independent publi-cation Acern Computers Ltd. Inequisi-turers of the Electron, ere not responsible for any of the articles in this issue or for any of the opinions expressed,

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drive with leed end e utilities disc.

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thet the certridge has a built in real time clock and a ROM socket (for additional softwere on a chip) then you'll realise why the Cumens floppy disc system has been so warmly welcomed by Electron users.





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#### **Educational software** galore for Electron A NATIONWIDE inthere said Gareth Wiladmits the Acorn men Special supplement Up to now their

vestigation by Acorn has revealed that there are up to 1.000 educational software titles currently evailable for the Flectron The study was launched in the wake of mounting criticism from

concerned perents who have been unable to locate suitable scholastic programs for their After the problem was first highlighted in

Elactron User, Acorn decided to crack the cese of the missing software Within only 10 days the company hed come up with a list of almost

250 titles - end it hen elreedy been suggested that this may be lust a quarter of those on the In all, there could be un to 1 000 titles out

#### NEW BRIDGE CONTRACT AN improved version of

Contract Bridge has been ralaased by Alligata Softwere-The firm is offering owners of the original

upgrade.

varsion a "new for old" problem. deal coating £1 for This can only be cessetta axchenue end £3 for cessette to disc

hems, the Acom marketing consultant in charge 'While wa knaw there was a lot aveilable. I was surprised to find

#### out just how much and that the quality of most is so good Breakdown

Gareth Williams is now collating the Electrop list - the first ever which gives a complete breakdown of each pro-

gram. Apart from the title. the name of the softwere publishers and the price, it provides datails of the type of subject covered. whether tope or disc and if any printed text is available with the progrem

What we have found to date is that the softwere covers across the range, without shortfells in any one pree" says Gereth Wil-

#### Availability

However, as comprehansive as the Electron list will prove to be, it does not in itself solve the basic availability

achieved by persuading the deelers to etock educational softwere". is too slow moving in comparison to games. able shelf space.

out if they don't. After all, it's the parents who shell out the money for the computers hoping it education. So if this situation

averyone is in trouble --

MINI Office, the chert

topping software pack-

age for the Electron

from Detabase Soft-

ware, is being used es e

teeching aid by leading

UK computer reteilers

Shortlisted for two

major categories in the

1985 British Microcom-

puting Awerds, Mini

Office has been selected

to bring the massage

home to W.H. Smith

steff that home com-

W.H. Smith

including the dealer".

And es a result, takes up 'However, I think they are going to miss

ware available for the Electron is to be publiehed as a special supplement with the next issue of Electron

magezine's ongoing commitment to the campaign to make a wide range of echolcarries on they may astic programs readily simply decide it isn't worthwhile to buy one available to readers. If this happens then "Once Electron

ACORN'S unique list at least know what to of educational softorder from their

dealers", saya Derek Meakin, the meneging editor of Electron Hear "In this way, it will

demonstrate to retailere just how large the demand is for these products. 'And from there on they will hopefully

realise tha undoubtad potential in carrying of renge of educational eoftware. In this way. the entire problem could be solved".

### le aveilable, they will Retail training aid

users have seen what

This will be under-

taken as part of the

outere have a serious application. The company is currently using the program in its mobile training classroom, which is on a nationwide tour

#### Canable "We have a lot of etaff and we want them

to know what the goods ara cepeble of which they ere selling. said a training spokesmen. W.H. Smith chose Mini Office because its four programs - word processing, database. apreadsheet end graphics - emphasise how easily a computer can be turned into an inexpen-

sive office tool. "At its revolutionery low price of £5.95. Mini Office is a truly cost effective way of introducing the business concept of computers to our eteff", said the men from W.H. Smith.



#### NEW ROBBY DAZZLER FORMER Fooland

and Manchester United star Bobby Charlton is the inspiration behind a new Electron football eimulation name. Helpo Charlton's knowledge of the

game, simulation specialiste DACC have come up with Bobby Charlton Socces The program includes a management module, enabling the player to master team building skille. a match play module,

olue voice instructions and play hints Radio honst

THE school radio series 'Mathe with a Story' has been ecomented by two software packs for the Electron, designed for home users as well

Written by former matha teacher Peter Smith, the programmee, aimed at the primary age group, have been given extensive trials in

The BBC Publications software is being published in two cassette packs costing £10.95 each - the first now, the second in Sentember The second of the maths radio series is being repeated this

meastro himself Available soon will

be the extra World Cun and Canon Lesque modules. Pricas range from



# **ELITE CHAMPIONSHIPS** FOR THE BIG SHOW

THE National Elite Championships are to be a major attraction at the first of this year's Electron & BBC Micro User Shows.

Playing the game FOR the first two

days of the Flactron & BBC Micro User Show the Elite stand will be open to the general public. Visitors will get the chance to see and play the sophisticated 6502 second processor version of the ton

selling game. The stand will be open all day Thursday May 9 and Friday May 10 and also on Saturday May 11 after the first Elite-athlon session finishes at

3pm.

Siv finalists from an entry of 5 000

have the chance of winning equipment and software to the value of £1 000. Forming the last stage of the competition - the world's first champlonship for the bestsalling "cult" space name - is a two-day

on to play a new second processor varsion of the all-colour geme now with faster graphics. It will be the first nublic Elite has sold more than 100.000 copies

Ite success has prompted Acornsoft to

very pleased thay have Finaliats will be celled chosen our show as the venue for the final" sava Darak Maskin bead of Databasa, the show's organisers

ment for Commodore and Spectrum versions

Naturally we pre

It will certainly be a major attraction at en avent which will once again prove to be the launching pad for all thet's new in the world of the Electron"

#### sign a licensing agree-Sports quiz released separately or in conjunction with the ouizzes

Flire athlog to be held at

the Show on the Satur-

THE third in the Kosmos Answer Back quiz proorams for the Electron has been released Answer Back Sport combines tennis and

The games can be run

but either way the objective is to best the Kosmos team. A master control program is first loaded into football gemas with a the Electron, allowing saries of quizzes on any of 26 quiz topics to be selected. Subjects covered range from athtetics to water eporte. As with the other titles in the series. Anawer Back Sport includes the facilities to enable the user to create, edit end save an unlimited number of naw, multiple-choics



#### Electrons brought in to train handicapped was started by Lorna comes ere designed SEVERELY handicepped and disabled

residents of Chashire Homes are using Electrone to entertain, educate end trein themselves for jobs. With becking from the Manpower Services

Commission, Robin Nixon and Steve Ludlow have set up extensive computer facilities at two Chechire Homes - Seven Springs and Heatherley - using To "interface" a resident to a micro may need

individual input controls and these are produced in workshops at each Home.

The computer roftware may also need to be modified, and this too is done on the premises, with the new versions being made evallable to other Cheshire Homes.

Experience to date has been highly encouraging. say those involved in the scheme Computers heve

helped people with

noor control to write

produce geometric

often the start of com-

puter interest have

The gemes that ere

computer graphics.

raising projects.

Favourite

able to follow edu-

cetionel courses, both in

methemetical subjects

and the arts including

languages. Spenish is a

fevourite course for use on holideys.

residents who ere not at

all interested in com-

puters and are happy to

leave new technology to

others. This is eccented

nuters like the Election

ere proving valueble and

adaptable communi-

cations devices, end e

But, for many, com-

and respected.

There ere, of course,

They are better

#### **Ouicker thinking** AN enhanced version of play against edults withthe challenging mental out being at a dis-

erithmetic progrem edventage Quick Thinking has been In Robot Tables the eim is to perform speedy produced for the Electron by Mirrorsoft. Oulet Thinking Plus make robots good comes in two parts end enough to pess the critical eye of the quality costs FR 95 News

for-old upgrades cost For stargazing Elac-Multiveders outs the tron owners. Mirrorsoft pleyer in charge of e has brought out Star robot invesion preven-Seeker on cassette for tion force Addition.

It ellows the user to follow plenets track stellations - end trece the neth of Heiley's Comet as it passes the

cation and division tasks have to be completed successfully within prespecified time limits. Levels of play can be

subtraction, multipli-

LOGO PACKAGE A COMPLETE schools

and home Logo package for the Electron has been leunohed by Honeyfold Softwere it consists partly of e set of classroom lessons presented in a formet designed for the primary

They ere supplemented by a set of work cards which integrete with the text. A comnanion guide assists the teacher in putting over

the major teaching points. Reflecting the needs of the older reader. "A Guide to Logo for Parents and Teachers" is also provided.

Honeylogo on tape or A programme called disc with the parent-COMPAIO - Computer Aid for Speech-Impaired teacher quide costs and Disabled People -

Ridowey then cheirman of management et Seven Springs eerly in 1002 Robin Nivon told

Electron Hear: "We were meinly concerned with solving the communication difficulties of some of our moreseverely-disabled residents using customised input devices and software.

#### Converted To get the project under way we conver-

ted en old etorage room into e computer room end took on eight previously unemployed trainers on e part-time hasis under the Opportunities for Volunteering Under the super-

heiped them devulaing of Stuart elop control end dex-McKeers, the computer butor the treinnes' tasks Worthwhile jobs can be performed by were to learn the basics residents - helping with of programming end computer use, end in the accounts for examturn pess these on to the ple, or organising fund-The scheme strug-

plad at first because there was only one readily-available progrem, but the situation gesed with the advent of the Electron end BBC micros with their extensive softwere renge.

projects of COMPAID wes a lerge-letter word-processor progrem to help visuellyimpaired people to read. This was followed by a two-switch-operated drawing program called Reinbow

As well as communicetion end graphic design software, gemes such as Petience (see nicture) were created to emuse end stimulate the

Save Nixon: "Meny commercially evailable

with keyboard or loystick long in mind end, being in machine

code, are hard to edept. "Heving ascerteined that two switches were the maximum thet our most severely disabled residents could easily use, we set about writing some games to help with the essessment

and (mprovement of One such geme is Luner Run a machine code arcade-style ection geme which can be pleyed using the joystick fire buttons or the Space and Return keys. Other projects tack led included a portable

Morse communicator for Merk e resident who has lost virtually all sught and heering.

#### Amplifier Text typed in et the keyboard was converted

into Morse Code, which was then output vie the consette interfece to a high powered emplifier. The Morse cen then

he felt - not heard through a set of head-Using this system. Mark won en essey competition on how hest to spend £650 for e

The cash was spent on edenting a hend-held computer as a Morse communicator, so he no longer needs to come to the computer room chet.

For the nest 18 months COMPAID hea been funded by the Mennower Services Commission Community Progremme. There are four full-time computer trainees, eight three workshop trainers

June 1985 FLECTRON USER 7

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#### THIS month we'll be leavinn our ANDs. ORs and ELSEs and moving onto the Besic keyword GOTO.

Simple to gresp but complicated in action. GOTO is not of the most powerful commends at the disposal of Rasio programmers. With it you can sending the program here. there and everywhere as need

The trouble is that like all powerful things it cen be Recause of this GOTO is frowned upon in polite pro-In Flectron Basic there are

other ways of achieving the same results as a GOTO and It surreally better to use them However you have to learn before you can really undermethods. And, used sensibly. they're not as awful as some

people make out. In fact I could go as far as to sey that there are no bad GOTOs, just bad program-

Anyway, those are my axcuses for teaching you about GOTOs and I'm sticking to them. Please note that atthough I'm showing you how to use them, that doesn't mean I went you to use them And if you do les you will don't tall anyone that I told you

After all that greamble let's see the beast in action. Try Program I end, when the thrill wears off, prass Escape to bring it to a halt

> 18 REM PROGRAM I 28 PRINT 'HELLO' 18 BOTO 28

Line 10 is just the REM that gives the program a title, while line 20 prints the friendly message The GOTO rears in-

What It does is to tell the program that it is to go to the line number following the antly named GOTO and carry on from there. In this case the GOTO of line 30 tells the Flactron to go back to line 20 of the program.

It did does this printing out the message and then

# There are no bad GOTOs - only bad programmers

Part 17 of PETE RIBBY's introduction to the art of programming

Electron passes to line 10 Try changing line 30 to 38 GOTO 38 Can you explain what is happening? It's enother infin-

Lat's leave GOTO for a moment end look at Program

GOTO which speeds the Flor-

working through the program

line by line, until it hits the

GOTO again and control of the

Here it cerries on es usual

tron back to line 10.

IO REM PROGRAM III 20 IMPUT "Mumber" number 38 IF number >28 THEN PRI MT number" is preater than 78\*

If you've bean following that series so far this should cause

you no difficulties. Line 20 asks for e number end if the number is greater than 20, line 30 talks you so.

Now suppose, for isasone best known'to vourself, that you wanted the message to be on a separate line You might think that you could put the message in line

40 and get to it via a GOTO after the condition of line 30. Program IV shows whet I

It looks fairly convincing 18 REM PROBRAM IV 20 IMPUT "Number" number

38 IF number > 28 THEN BOT 48 PRINT number" is grea ter than 20°

comes to line 30. Here the GOTO egain sends the micro beck to process line 20, the message is printed, it goes onto line 30 end the whole thing starts over egain.

way lines 20 and 30 cycle it's called an infinite loop. In this case I meent it to be an infinite loop, but usually they crop up to 'hano'

Even though the above example is fairly simple, you can see the power unleeshed by a GOTO. We have a threat thousends of HELLOs. To be a little bit theoretical

done by eltering the flow of control of the program. This is simply the order in which the micro processes the program's lines. The program controls the micro, the lines that it consists of telling the Electron

Up until now ell our programs, except for one case have sterted at the lowest line number and worked relentinssly through lines of ascending numbers. Line 10 was

repressed then linz 20, then 30 end so on. The flow of control was simple and streightforwerd When we came to condi-

tionals we found out how IFs and THENs could decide if all or part of a progress line was processed, but still control nassed from one line to the line with the next highest

Only with the FOR ... NEXT loops did we come across a jumped backwerds. The linear flow of control we were used to was changed into e loop (we'll deal with this next

As you can see, using GOTO hee e profound effect on the flow of control. Have a look et ite use in Program II: 18 REM PROGRAM II

28 PRINT "WELLD" 30 6010 18

Here the Electron starts at line 10 and then ones on to lines 20 and 30 as normal Line 30, however, contains a

#### From Page 9

doesn't it? All thet we've done
is to move the message of line
30 to line 40 end "glue" the
two together with a GOTO.
The trouble is, it doesn't work
The program is fine so long

The program is fine so long as the numbers you enter are ebova 20, but look whet happens when you type in a number like 12. You get told

#### 12 is greater than 28 Can you figure out why this

has happened? Let's take the case where you enter a number that is greeter than 20, say 100

The Electron comes to line 30 of Program IV and checks the condition effer the IF. As 100 is greater than 20 the condition is true and the micro goes on to perform whatever comes after the

Here it finds a GOTO and, ever obedient, it goes to line 40 and prints out the message So fer, so good

Suppose, however, that you had entered 5, which is obviously not greater then 20. Now the condition of line 30 is false, so the Electron ignoras everything efter the THEN and goes on jo the next line as normal.

Line 40 tells it to print out a message, and so it does. Never mind the fact that the message is wrong, the Electron just does whet it's told. Lina 40 says print a message there's nothing to stoo tha

there's nothing to stop that program reaching line 40, so the message gets printed. As you can see, using a GOTO can have unexpected consequences. Line 40 is printed in aither case.

printed in aither case. When the number is greater than 20 the GOTO ansures that line 40 is obeyed. In the other case, the program carries on to line 40 just by doing what it does normally, going from one line to the next.

The remarky is simple. Whet we really meent at line 30 was that the Electron was to print the message if the condition was true or else to stop there. Program V shows how this is achiaved.

Here the END after the

18 REM PROGRAM V 28 IMPUT "Number", number 36 IF number)28 THEM GOT n am F1SE END

48 PRINT number" is greater than 20"

Progrem V

ELSE of line 30 does just thes.

If the condition is felse that micro goes to the pert after the ELSE finds the END there and helts. Line 40 doesn tine to

From this you should see that using GOTO thought-lessly can cause all sorts of problems. In this case it was easy to find where the fault fay, but in long complicated pro-

spot the error. Usually it's come from an ill advised GOTO. What makes things worse is the way that the buck can

hide, only coming out to play et odd times.

After ell if we hadn't heve tested Program IV with numbers less than or equal to 20, we'd have never noticed the

Of course, if we'd have shown our mesterpiece to our friends they'd find the values that trigger the error straight eway!

Program VI shows an

Program VI shows an attempt to make Program V print a messege if the number input is less than or equal to 20. Before you type it in end run itheve allook at it and see if you can see any flews Line 30 looks fairly convin-

cling. If number is greeter than 20 the condition is true end the GOTO after the THEN sends the Electron to the eppropriate message at line 40. If it isn't the case, the GOTO efter the ELSE is obeyed and line 50 produces its message Try it and see

Heve e look at the condition of line 30. Make sure that you tast the program with values that make it both true and false

happens in every eventuelity.
As you'll find, the program works well enough if the numbers are less than or equal to 20. The trouble is that when you give number e velue above 20. you get both messages instead of just the one you.

18 REM PROGRAM VI 28 IMPUT "Number", number 38 IF number)28 THEM GOT 0 48 ELSE GOTO 58

40 PRINT number\* is greater than 20"
50 PRINT number\* is less
than or equal to 20"

Program VI

wanted. It's exactly the serve problem as before When the condition of line 30 is falsa then control immediately goes to line 50 and the message is correct. However, when the condition is fulfilled with a value of

number such es 25, then things go wrong. The GOTO after the IF sends control to line 40, which the Electron then obeys. This would be fine if things stopped there, but then control opes to

line 50 - why shouldn't it? There's nothing to stop it. Now you get the second, erroneous messege. The progrem hes creshed into a line you didn't want to be obeyed in those circumstances. Program VIII shows how things can be improved with the eppropriate ENDs to bring things to e helt:

10 REM PROGRAM VII 20 IMPUT "Number", number 30 IF number 20 TMEM 60T 0 40 ELSE 60TO 50 40 PRINT number" is greater than 20":EMD

58 PRINT number" is less than or equal to 28°:END Program VII

One thing you might heve noticed is that there is no real reason for using GOTOs et all in the above example. The program could be written without them using simple IFs.
This is true of many of the

times that GOTO is used.
Often there's a simpler way of
doing things, less fraught with
difficulties then using GOTO.
The trouble is that it's often
esser to slipe in a quick GOTO.

with all its dangers than to shink of the simpler method. There's no surer sign of a poor programmer than e listing filled with GOTOs. They have e sort of "if in doubt, use e GOTO" mentelity which mekes programs almost unin-

What can make things worse is when they discover that you don't always have to put in the GOTOs. Program

> 18 PEM PROSPAM VIII 28 IMPUT "Number", number 38 IF number 28 THEM 48 ELSE 58 48 PRINT number" 15 nega

ter than 20°:EMD S0 PRINT number" is less than or equal to 20°



VIII shows what I mean.
While line 30 isn t elt that
difficult to understand, when
you get a lot of them together
tistings become almost
impossible to follow Notice
also that in line 50 live lieft off

The point I've been trying to make is that GOTOs are easy to understand but complicated to use. When you stort using them they have all sorts of unexpected side effects.

Sunnose we wanted to add

suppose we wanted to add e final message to Program VII. You might think that ell wa had to do wee edd a line like line 60 in Program tX

10 REM PROGRAM II 20 IMPUT "Number", number 30 IF number >20 THEM GOT 0 40 ELSE GOTO 50 40 FRINT number" is grea

40 PRINT number" is greater than 20":EMD
50 PRINT number" is less
than or equal to 20":EMD
60 PRINT "That's all fol

ks<sup>14</sup> Program IX

Try it and see what happens. There's no final meesage because of the ENOs of lines 40 and 50. And you cent solve the problem by just leaving them out.

Again, try it and see what.

Again, by it and see while happens. What you have to do is shown in Program X. Here the ENDs have been replaced by GOTOepointing to the final message. Whichever

path through the program the Electron takes after line 30, still ends up printing the message of line 60. Notice that once you start using GOTOs you've got to use them all over the place to "loap over," bits of code, you don't.

want
Suppose that number was
5 in the fast program. Then
the flow of control would go
from line 30 to fine 50
favoiding time 401 and on to
line 60. On the other hend, if
number was greater than 20
the program would go from 30
the program would go from 30

to 40 and then on to 60, evoiding line 50. As the number of GOTOs in a program mounts, so the number of leeps grows, as do 18 REM PROGRAM I 28 IMPUT "Nueber", nueber 78 IF nueber 278 IMFN 601

38 1F number 28 THEM SOT 0 48 ELSE SOTO 58 48 PRINT number" is grea ter than 28":SOTO 68 58 PRINT number" is less

than or equal to 28":50T0 50 50 PRINT "That's all folks!"

Program X the chences of landing in the wrong place.

wrong place.

Remember that if it can go wrong it will, and the more GOTOs you use the more things will go wrong and the

harder it will be to sort them out If you went to see a real horror, take a look at Progrem

> 18 REM PROBRAM II 28 60T0 48 38 60T0 58 48 60T0 58 58 60T0 68 58 60T0 38 78 PRINT "MADE IT":END 88 60T0 78

Program XI

I leave it to you to figure out what's happening. The flow of control is all over the place.

leaping from line to line in gay ebundon.
You'd be surprised at the number of people who write programs like this and than worder why things go wrong!

wonder why things go wrong! Figure I is an attempt to show what is happening. From it you should be able to see why progremming using tots of GOTOs is called spaghatti progremming.

Bafora you leava Program

XI, try renumbering it with: RENUMBER 188

SEWINGED 5

Not only will your Electron renumber the lines, it will also deal with the line numbers ofter the GOTOs

ofter the GOTOs.

Now after all my warnings egenst the use of GOTO I'll give you an exemple of when I would be form.

think it is justified, in the form of Progrem XII.

This re what is known as a mugtrep. It is designed to evoid people putting in arron-

evoid people putting in arroneoue inpute to your programs. Bibby'e first taw of programming stetes that if you esk someona to input in a number between 1 and 10

they will enter 11 or =1 or anything but whet you ask. Mugtrapping deals with the by ignoring any input not in the required range.

Lina 30 does the work. If number isn't in the required range then the GOTO sends the program back to line 20 and lats the mug have enother go. The program won't proceed to line 40 until number is lin range.

This is one eree where I

28 INPUT 'Mumber in rang a 1-18' 'number' 38 IF number(1 OR number

>10 THEN GOTO 20 40 PRINT number " is in range"

think using GOTO is allowable. After ett. I can't see enything that complicated in just going to the previous line. Howavar, there are some who would still frown on this and go to ridiculous lengths to avoid it. So if you use a GOTO avoid it. So if you use a GOTO.

Figure 1:

programming

in a mugtrap you didn't get the idea from me If you want a bit of fun, try

altering Program XII so that it ellows the user three goes and then prints out a rude messege if he still doesn't get it right Program XIII is a variant of Program XIII Here I ve stored

the line number in the variable notinnenge. This mey seem a little strange, but notice how line 40 seems to make a lot more sense.

If I have to use a GOTO I

much prefer to use it this way, as when things go wrong I find it assign to understend something like:

288 60TO explosion rether than the anonymous: 288 60TO 588

200 5070 708

The only drewhack to this method is that RENUMBER

can't be used Try.

RENUMBER 15

on Program XIII, run it and you'll see why.

28 notinnanger38
38 1MPUT "Number in rang
a 1-10" "number (1 OR number
>18 THEN 8010 notinnange

SB PRINT susber " is in range"

And that's about it for this month. A whole article telling you about something that I'd

advise you not to use! Such is the strenge world of computer programming. Heving said that, have a go at using GOTO in your programs. You'll find that as

at using GOTO in your progrems. You'll find that as the programs increase in langth and GOTOs, so the errors multiply Finally, take a look et Program XIV:

18 REM FROGRAM IIV
28 LET variable\*1
38 PRINT variable
48 LET variable\*variable
\*1
50 IF variable (=18 THEM
5010 38

Does this remind you of anything? If it does, then go to the top of the class.



### THIS month I thought we'd



Branching out

have e look et the use of recursion in pattern drawing with Trees. This program defines o

procedure to draw two brenches of a tree. The procedure then calls itself over end over from within the procedure to form the finel pattern



PD DRAW seeds-offsets.s ed + offset Vas MOVE seeds, seeds

ing Scow seed: +offset:.se edyroffeet. 110 PEN Calculates left o

178 saleseed - offsetassyl seedstoffsetr:lylelevel+1

138 IF Ivida THEN PROCEED 8(51].5v1.1v1.188.188 148 REM Calculates right coordinates

158 sermseederoffsetrisyr -seedytoifsety:[s]=[pyp]+1 168 IF 1v1/6 THEN PROCERE elser, syr, lyl, 188, 188 178 ENDPROC

Figure 1. Parameters used in PROCtree

#### PROGRAM EXPLANATION

120

130

170

10,20 The usual REMs explaining what's going Puts the Electron in Mode 1. Try the other grephics modes This calls PROCtree, the peremeters in the is to stert at point 600,100. This level is to

he called lavel 0 and the X and Y offsets are both to be 100. Again, try other values and sea what happens Stops the program crashing into the procedure definition Form the definition of PROCtree, It's hare

60-170 is called from the main program. Figure I shows how the parameters in the breckets **PROCtres** 

70 Moves the graphics cursor to the initial Draws the branch to the left by joining tha

> offsets The graphics cursor goes back to the initial

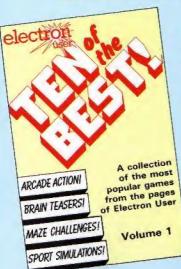
point, ready to draw the second brench. Now the branch to the right is drewn. This line isoletes the coordinates of the lefthand point of the initial branch, etoring them in sxl and syl. These will be used as the initial point for another pair of branches. /w/ takes account of the fact will be one higher

Recursion in ection. PROCtrea is called again, this time using the end point of the starting point. It is the coordinates of this point, along with the adjusted level and the stendard offsets, that are passed to the procedure. This happens until the sixth

150,160 These lines egain call the procedure repeatedly until the sixth level is reeched. Each time the procedure is celled enother pair of branches will eventually be drawn. This time it uses the righthand points of pravious branches es the starting points of the new branches drawn with PROCtree.

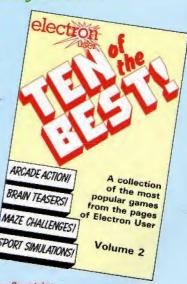
Ends the procedura definition

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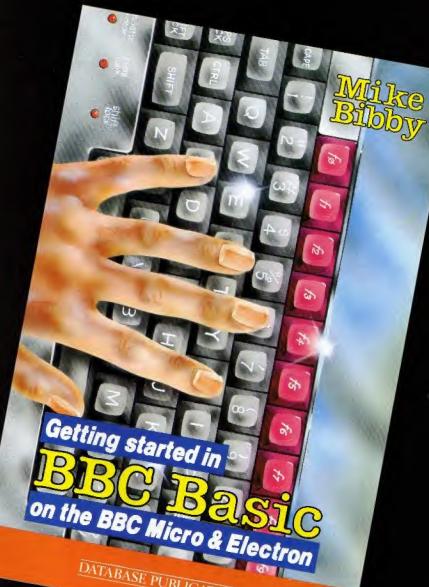
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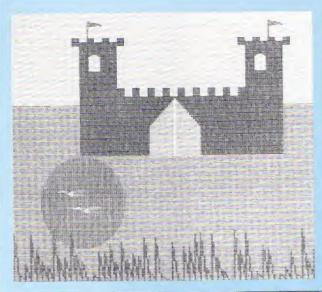


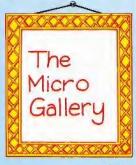
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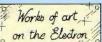


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CASTLE, an elegant and well-structured program by ADAM WORTLEY, shows what can be done with Electron graphics and a little imagination. The only things lacking are the princess and the frog!

IR REM CASTLE 28 REM by Adam Wortley 38 REM (C) ELECTRON USER SB REM 70 HODE? 90 VOU 23.0.8202:0:0:0: 98 PROCinit 100 PROCsky 118 PROCpool (308, 300, 175) 120 PROCorass 138 PROGrastle 140 REPEAT: UNTIL FALSE ISB END 160 DEFPROCSKY 170 COLOUR132 188 CLS 198 VDG 28.8.31.19.11 200 COLOUR 130 218 DLS 228 VDU 26 230 ENDPROC 240 DEFPROCHODI (X,Y,R) 250 GCOL 0.6 260 LOCALI, J

278 FOR 1=Y+R TO Y-R STEP

280 J=SQR(ABS(R\*R-(1-Y)\*(

298 MOVE X-J.I

320 DRAW X+J, I

328 MOVE X.Y

318 NEXT

1-Y)))

338 ENDPROC 340 DEFPROCurass 350 MOVER. 0 368 GCOL 8.3 370 FOR M=0101279 STEP 24 388 DRAW M. 8 398 DRAW M.RND (200) 488 NEXT 418 ENDPROC 420 DEFPROCcastle 438 COLOUR 3: COLOUR 132 448 VOU 29,4,28,19,8 458 LET AS=STRINGS (3," ") 458 LET BE-STRINGS (8.CHRS 478 LET C\$=CHR\$226+STRING \$(13.CHR\$229) 488 LET 05=" "+CHR\$ 238+A \$+" "+CHR\$ 238 \$98 LET ES=" "+CHR\$ 231+A

"+CHR\$ 231

4+CHR\$224+CHR\$225+\*

R\$225

9+CHR\$229

7+CHR#229

500 LET F#=CHR#224+CHR#22

+CHR\$224+CHR\$224+CHR\$224+CH

510 LET G#=CHR\$226+CHR\$22

528 LET HF=CHR\$226+CHR\$22

530 LET 1#=CHR#226+CHR#22

7+CHR\$229+A\$+CHR\$226+CHR\$22

9+CHR\$229+A\$+CHR\$225+CHR\$22

8+CHR\$229 548 LET J\$=CHR\$226+CHR\$22 9+CHR\$229+3\$+CHR\$229+CHR\$22 9+CHR\$229 558 COLOUR 5: PRINT D: PRI NT FS: COLOUR 3: PRINTFS: PRIN TOS: PRINTHE: PRINTIS: PRINTES :PRINTGS:PRINTJ\$:PRINTC\$ 588 COLDUR 138 578 FOR A=8105 586 PRINTES 598 NEXT 500 BCDL 8.1 618 FOR N=598TD695 STEP 4 628 MOVE N. 476 638 DRAW N.N 64BNEXT 450 LET X=695 568 FOR P=695 TO 888 STEP 4 578 LETX=X-4 689 MOVE P.476 ASE DRAW P.X 700 NEXT 718 GCOL 8.8 728 MOVE 495,476 738 DRAW 695,698 748 VDU26 750 PRINT TAB(3.21)::COLO

HR 134: PROCOUCK

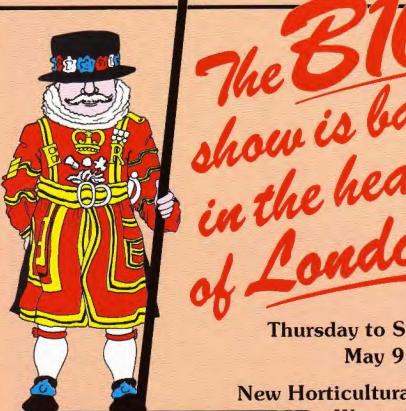
UR 134: PROCDUCK

749 PRINT TAB(4,23):: COLO

8+CHR\$729+A\$+CHR\$225+CHR\$22 778 ENDPROC 780 DEFPROCOUCK 798 COLOUR 4: VOIL 232 800 COLOUR 2: VDU 233 818 ENDPROC 828 DEFPROCinit 838 VDU 23,224,248,248,24 8,248,255,255,255,255 849 VDU 23,225,240,248,24 8.248.248.248.248.248 858 VDU 23,226,15,15,15,1 5, 15, 15, 15, 15 868 VDU 23,227,231,195,12 9,129,129,129,129,129 878 VDU 23,228,129,129,12 9.129.129.129.129.129 889 VDU 23,229,255,255,25 5,255,255,255,255,255 898 VDU 23,238,192,248,25 4,255,249,192,128,128 1,7,3,1,8

900 VDU 23,231,128,128,12 8.128,128,128,128,128 910 VOU 23,232,0,48,241,1 928 VOU 23,233,8,126,252, 248,224,248,248,36 930 LET X=1380 948 ENDPROC This listing is included in this month's cassette tape offer. See order

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places them in arrays. Draws screen.

PROCsetup Prints score. PROCch

Changes screen display and chooses PROCdead **PROChonus** number of rows.

Prints instructions. Prints high score table. PROCins PROCHI\_SC

#### VARIABLES

ac%, UP% Position of your car. SC% Score. X%, Z%, Q% Position of opposing cars.

HIS, HI% High score. E%(), W%() Random numbers.

IN REN DODGE

28 REM BY STEPHEN MERRI

BAN

30 REM (C) ELECTRON USE R 1985

48 ON ERROR SOTO 1298

50 MODE6: VDU23, 1.0:0:0:0: B: PROCins

**AB HODES** 

78 PROCVAY

88 VDU23,1,8;0;0;0

98 VDU28

188 DIN WY(6):DIN SY(6): DIN EZ(6): DIN HIZ(7): DIN H I\$(7):FOR I=5TO1STEP-1:H1%( I)=10:HI\$(I)="STEVIE":NEXTI

110 PROCEND

120 PROCsetup

138 REPEAT: PROCdown: PROC move man: UNTIL WEX=1

148 MODE6: IF SCI HIX (5) PROCHI

158 PROCHI SC: HODES: PROC var: VDU23,1,8;8;8;8;9;VDU20;P

RDCrnd:PROCsetup:60T0130 160 DEF PROCVAR

17811=5: ac1=2: UP1=24: 21=8 :STEVIE1=100:SC1=0:C1=10:CC Z=8: 0X=18: ERX=11: A\$="

: UYX=0: LIX=3: WEX=0: JJX=0 188 RESTORE 1588

198 FORA=224 TO235 200 READS, W.E.R.T.Y.U.I

218 VDU23, A.Q. W.E.R.T.Y.

228 NEXTA

230 ENVELOPE1, 2, -12, 8, 16

.32.64.1.-48.-18.18.-126.12 6,126

248 ENVELOPE2, 1, -10, -5, -3,5,7,18,127,8,8,-126,126,1

250ENDPROC

268 DEF PROCdown

278 71=71+1: XX=XX+1: IF C CX=19X=9X+1

286 PRINTTAB(2, ZZ-1); A\$: TAB(2,XX-1):A\$: IF CCX=1 PRI NTTAB (2, 0%-1): A\$

298 COLOURI

300 IF CCX=1 PRINTTAB(2,

QX):B\$ 318 PRINTTAB(2, ZX); CF; TA

B(2.XX): 06 320 IF XX=UPX AND AX=acX THEN PROCCH

330 IF IX-UPY AND BI-ack THEN PROCCH

349 IF CCY=1 AND QX=UPX: IF VVI=ack THEN PROCCH 358 IF XX=UPX AND AX()ac

I THEN PROCdead

3AB IF IX=UPY AND BI()ac

I THEN PROCHEAD

378 IF CCI=1 AND GI=UPI: IF VVX()ac% THEN PROCdead 388 IF ZZ>UPZTHEN PROCES

390 IF 2X>UPXTHENZX=8 400 IF XX>UPX+5THENXX=5

418 IF QX>UPX+18THENQX=1

428 FOR ANYX-ITOSTEVIEZ: NEXTANYI

438 ENDPROC

448 DEF PROCHOVE man 450 COLDURG

468 IF INKEY (-67) THENACE =acX+1:PRINTTAB(acX-1,UPX); " ": BOTO488

478 IF INKEY (-98) THENAC'S \*acZ-!:PRINTTAB(acZ+1.UPZ);

488 IF acl>6THEMacl=6

498 IF ac% (2THENac%=2

500 PRINTTAB(act, UPI); CH R\$225

510 ENDPROC

520 DEF PROCEND

538 PRINTTAB(2, UP1+1); A\$ ;TAB(2,UPX+6);A\$: IF CCX=1 P RINTTAB (2, UPX+11); A\$

548 YUX=INT (UYX/28)

558

568 GOSUB 698

570 FOR12=2 TO 6: WZ (IX)= 224:5% (1%) =224:E% (1%) =224:N

588 81=RND(5)+1:WX(BX)=2 26

598 AX=RND(5)+1:SX(AX)=2

600 IF CCI=1 VVI=RND(5)+ 1:EX (VVX) =226

610 IF CCX=1 B\$=CHR\$EX(2 1+CHR\$E%(3)+CHR\$E%(4)+CHR\$E 1(5)+CHR\$EX(6)

628 C\$=CHR\$W%(2)+CHR\$W%( X) + CHR\$WY (4) + CHR\$WX (5) + CHR\$

WY (6) A38 D\$=CHR\$SX(2)+CHR\$SX( 3) + CHR\$SX(4) + CHR\$SX(5) + CHR\$

57 (4) 648 UPX=UPX-1

458 IF UP%(ERI THENUP%= ERI

670 IF STEVIEX STEVIEX =STEVIEX-2:UYX=UYX+2

580 ENDPROC

698 COLOUR139: COLOUR9: PR INTTAB(10,11);" =LEFT\$ (CHR\$227+CHR\$227+CHR\$ 227+CHR\$227+CHR\$227, YUX):PR INTTAB(10.11): EHR\$228+CHR\$2 29+CHR\$226+E\$+CHR\$226:COLOU RI31: RETURN

788 DEF PROCeetup

710 VDU20: COLOURI31: COLO URB: CLS: R=#

728 COLOUR129: FOR!=1707: PRINTTAB (9, 9+1);\* ": NEXTI: COLOUR138

738 605UB698

748 COLOURISB: PRINTTAB(1 0.13): CHR\$232+CHR\$233:"

": COLOUR! 29: COLOUR3: PRINT TAB(12,15); CHR\$224+CHR\$224+ CHR\$224; TAB (16, 18); CHR\$234+ CHR\$235

750 COLOUR2: COLOUR131

760 FOR1=1TO29: PRINTTAB( 1, I); CHR\$ (238+R)+" \*+CH R\$ (238+R)

770 IF R=1 R=0 ELSE R=1 788 SOUND8. - 15. T. 1: NEXT

798 ENDPROC

BOO DEF PROCCH

818 SCI=SCI+CI:SOUND1,-1

5.50.1

828 IF SCX=300 OR SCX=90 @ OR SCX=1600 OR SCX=2200 PRINTTAB(2.0%):A\$: TAB(2.2% ); A\$; TAB(2, XX); A\$: PROCbonus

838 COLOURB: COLOUR138: PR INTTAB(13.13); SCX: COLOUR131

848 ENDPROC 950 DEF PROCdead

860 LIX=LIX-1

878 FOR IX=15TO1 STEP-1: SOUND1,1,1%,1:SOUND1,1,1%+5 .1: PRINTTAB (ac X, UPX); "X": NE XTIX

888 IF LIX-1()-1 COLOURS :COLDURIZ9:PRINTTAB(13,15): LEFT\$ (CHR\$224+CHR\$224+CHR\$2 24.LI%-1):" ":COLOUR131

898 PRINTTAB(2.9%): A\$: TAB (2, 2%); A\$; TAB(2, %%); A\$

988 QX=18: XX=5: ZX=8

918 \*FX15.1

928 KEY=[NKEY(188) 930 IF C1=0 UP1=17ELSEUP

1=19 948 IF LIX=0 WEX=1

950 PROCENT

966 ENDPROC

978 ENDPROC 980 DEF PROChonus

998 COLOURS

1888 STEVIEX=STEVIEX+5

1818 PRINT TAB(8,8) "B 0 N II ST

1020 FORSX=1TOSSTEP1:SOUN D1.1.SX\*5.1:SGUND1.1.100.1: NEXTSX:FORSX=15T01STEP-2:50 UND1,1,50,1:50UND1,1,5%+5,2 :NEXTSE

1838 FORI=1 TO688: NEXT

1848 PRINTTAB(8.8);"

1858 SCI=SCX+58

1068 +FX15.1

1070 SOUND1,-15,50.2

1888 KEY=INKEY(58):SDUND1 ,-15,50,1

1090 VDU19.3,2:0:0:0 1100 KEY=INKEY(50):SOUND1

.-15.180.2 1118 VDU19,1,4;8;8;8

1120 KEY=INKEY(50):SOUND1

,-15,150,3 1138 IF CCX=0 605U81158 E

LSE GOSUB 1178 1148 ENSPROC

1150 JJX=JJX+8: IF JJX>58

JJX=59 1160 STEVIEX= (58-JJX): UYZ = (42+JJX): ZX=0: XX=5: QX=10: C

CX=1:UPX=19:ERX=16:PROCrada RETURN 1178 JJX=JJX+8: IF JJX>583

JZ=58

1180 STEVIEX=(58-JJX): UYX = (42+JJ2): ZX=0: XX=5: QX=10: C CX=0:UPX=24:ERX=11:PROCENT: RETHEN

1190 DEF PROCHI

1200 INPUTTAB(8,5): "YOU A RE IN THE TOP 5"; TABIB, 4); "

C(7): "Please enter your nam e": TAB(13,13); "----"; TAB(13,12)5\$:5\$=LEFT\$(5\$,10 ):H[\$(7)=S\$:H[%(7)=SCI

1210 FOR 1=5 TOISTEP-1 1228 [F HIX(7))HIX(1) PRO

Cswap

123@ NEXTE

1248 ENDPROD 1250 DEF PROCSWAD

1260 HIX([+1)=HIZ(I):HI\*( 1+1)=HI\$([]

1278 HIX(I)=HIX(7):HI\$(I) =HE\$ (7)

1280 - ENDPROC

1290 MODE6: SOUND1,-15,188 .1::REPORT:PRINT" at line ' :ERL:END

1300 DEF PROCins 1318 CLS

1320 PRINT'SPC(12); "INSTR UCTIONS"

1338 PRINTSPC(12); "-----

- 1340 PRINT"You are in a r acing car on a busy track."

1350 PRINT'Two rows of op posing cars will come" "str aight for you. This will in crease" "to three and as th e game progresses" "will re turn to two, but this time t he"'"speed will be increase d. \*

1368 PRINT' Each time you pass the rows of cars" "yo will move up the track, th us" reducing your time to react."

1370 PRINT' As you play, t he screen display changes." 1380 PRINT' SPC(12); "Your

keys are:" 1390 PRINT'SPE(14):"I- LE

FT" 1400 PRINT'SPC(14); "X- RI SHT"

1418 PRINT'SPC(12): "PRESS SPACE"

1428 REPEAT UNTIL GETS="

1430 ENDPROC

1440 DEF PROCHI SC

1450 CLS

1468 PRINTTAB(7,4); \*\*\*\*\* \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

1470 FOR I=1 TO 7 1488 PRINTSPC(7);"+

1499 NEXT

1588 PRINTSPC(7); \*\*\*\*\*\*\* \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

1518 FOR [=1705 [520 PRINTTAB(9,5+1); 1; " ":HI\$(!):TAB(22,5+1):HIX(!)

1538 NEXTI 1548 PRINT """"SPC(5); "D D YOU WANT INSTRUCTIONS (Y/

1550 REPEAT: BB\$=GETS: UNTI L BBS="Y" OR BBS="N"

1560 IF BB\$="Y"CLS:PROCin

1578 ENDPROC 1588 DATA24,98,126,98,24,

N5 °

70,126,98,24,189,255,189,68 ,189,255,153,0,0,0,0,0,0,0,0, 0,0,0,255,255,255,255,0,0,0 ,221,149,221,81,209,8,9,8,1 83.37.181.37.183.0.0.8.8.16 ,16,32,32,32,32,32,32,16,16 ,8,8,8,8,8,219,146,218,82,2

19,9,8 1598 DATAM, 187, 178, 179, 17 8.171.8.8.8.87.117.87.85.85 ,85,0,0,80,90,32,80,80,84,0

This listing is included in this month's cassette tape offer. See order form on Page 61.

IT must be the dream of every programmer to get the maximum happening in a program from the minimum amount of typing in.

If, at the same time, it's possible to make the program more understandable and run more quickly then that would be wonderful.

This article shows one way in which such a seemingly optimistic dream can come true.

It's amazing how often you need to use the same piece of code over and over again.

There seem to be lots of occasions when it's all too easy to repeat yourself and this can make your listing remarkably long.

The first example, Program I, which doesn't do anything very special, shows what I mean.

- 10 REM PROGRAM I 28 PRINT"Title Page"
- 3# PRINT\*Press space to
- 48 REPEAT UNTIL GETS=" "
  - 50 CLS
- 68 PRINT Instructions
- 70 PRINT'Press space to continue
- 88 REPEAT UNTIL GETS=" \* 98 CLS
- 188 PRINT"Play the game" 118 PRINT"Press space to
- continue"
  128 REPEAT UNTIL GET\$=" "
  - 138 CLS 148 RUN
- Program I

It's a very silly program in

It's a very silly program in which lines 20 60 and 100 represent whole chunks of code.

Now consider lines 30, 40 and 50. Lines like these are frequently needed in programs. They hold things up until the Space bar is pressed and then clear the screen before moving on to the next section of the program.

You'll notice that lines 70, 80 and 90 are just the same as 30, 40 and 50, and so are lines 110, 120 and 130.

Wouldn't it be nice if there was some way of avoiding this? Well, there is a structure available to do this job. It's called the subroutine.

A subroutine is a chunk of

# GOSUB – for those routine tasks

#### ROGER FROST explains this powerful structure which can help make your programming much more efficient

code that can be accessed (or used) from any point in a program by the Basic keyword GOSUB.

When the program reaches a GOSUB statement it jumps to a separate section of code (the subroutine) and processes it.

At the end of the subroutine another Basic keyword, RETURN, is found. This shouldn't be confused with the Return key on the Electron.

When the RETURN statement is reached the computer goes back to the main program immediately after the GOSUB command. Figure | shows what's happening.

Normally the Electron deals with one line after another, 10 then 20, then 30. As you can see from Figure I, GOSUB changes all this.

When It comes to line 30 the Electron shoots off to the subroutine at 100. Here it obeys the following lines until it comes across a RETURN which sends it back to the line after the original GOSUB. It

then carries on as normal,

You may want to use lots of subroutines in your program so, to avoid confusion, each one is labelled with the line number it begins at.

To call up a subroutine starting at line 500 you type in GOSUB 500. Figure II shows a program route with two subroutines.

Program II is a rewrite of Program I, but using a subroutine to replace those repeated lines.

As you can see, that's cut down on the repetition of lines. In fact one of the main uses of subroutines is to make the computer carry out a task more than once with just one piece of code.

At first sight Program III seems to offer little advantage over Program I. It's only one line shorter, but for each additional occasion you wanted the subroutine, extra lines would be saved.

Apart from saving on typing time, you also use less of your precious RAM. This could be



128 CLS 138 RETURN

very important if you were writing a long program, particularly in a memory-munching mode.

110 REPEAT UNTIL GETS=" "

You may notice that an extra REM statement has come in at line 90. It really is worth labelling subroutines in that way so that if you have several you can quickly tell what each one is for.

If you find you have to use the RENUMBER command when programming, you need have no fears regarding GOSUBs with a line number. Your clever Electron will automatically adjust the GOSUB line numbers for you.

Try adding this extra line to Program II:

15 PRINT Author - Fred Bloggs\*

Now RENUMBER it (Func B will do the job.) You will find

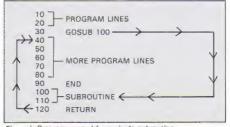


Figure I: Program control for a single subroutine

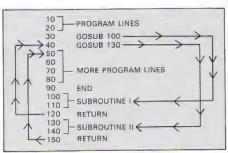


Figure II: Program control with two subroutines

that the subroutine now starts at line 100 and all the GOSUB statements have changed to GOSUB 100. Clever, isn't it?

It is, however, quite a good idea to use a standard numbering system. Subroutines could start at lines 1000. 2000, 3000 etc. This helps to make the program easier to follow, but it needs forward planning to avoid having to renumber.

Using subroutines can aid your programming in that each subroutine can be devoted to a single task.

Large programs are more manageable when they are broken down into smaller sections. It's a very good example of divide and conquer!

If you look at the listings for many programs, particularly those originally written for other computers, you might see a start something like this:

> 18 GOSUB 500 28 60508 1888

38 GOSUB 3888

40 SOSUB 5000

Each subroutine will be devoted to a specific task and may even be an off-the-peg routine that the programmer had stored away ready to use.

In Program II the GOSUB statement had an actual line number after it. If you want to live dangerously you can use a variable instead of a line number.

Program III shows what I

This little program just calls three subroutines at lines 100, 200 and 300. This could be a very snappy start to a program, but great care and forethought are needed because this

18 REM PROGRAM III 20 FOR X=100 TO 300 STEP 188 38 GOSUB 1 48 NEXT X SE END 188 PRINT'SUBROUTINE 1" 118 RETURN 200 PRINT\*SUBROUTINE 2" 218 RETURN 388 PRINT"SUBROUTINE 3" 318 RETURN

Program III

cannot be renumbered successfully.

If you were to use the RENUMBER command on Program III you'd get an error message "Failed at line number" whatever. This happens because, clever though your Electron is, it does not know the value of X until you run the program.

However this is a minor drawback compared with the effect using variables in subroutine calls can have on a program's readability. After all,

### **GOSUB** instructions

makes a lot more sense than

#### GOSUB 12345

While we're talking about line numbers, you may like to know that it's possible to GOSUB to a calculated line number that's calculated while the program is actually running.

You could use this technique within a game to jump to a random routine. Program IV shows a safe, slow way of selecting one out of three routines.

This could be replaced by Program V, making use of an expression to calculate which number to jump to for the subroutine.

Not only has this saved three lines of code, but it's

18 REM PROGRAM IV 28 Y=RND(3) 38 IF X=1 THEN GOSUB188 48 IF X=2 THEN GOSUB280 58 IF X=3 THEN GOSUB308 AR END 188 PRINT" X=1" 118 RETURN 288 PRINT" X=2" 218 RETURN 300 PRINT"X=3" 310 RETURN

Program IV

speeded things up, as the computer no longer has to work through the IF statements.

In fact, to repeat Program IV 100 times takes 1.85 seconds while Program V does the same job in 1,48 seconds. Mind you, while Program IV will happily renumber, Program V will not.

Don't expect either of them to do anything wonderful as they stand. Remember that the subroutines in them represent a chunk of code with a specific task.

One of the most powerful features of GOSUB occurs

IN REM PROGRAM V 28 GDSUB(100+RND(3))

30 END

188 PRINT"X=1"

110 RETURN 200 PRINT" 1=2"

218 RETURN

300 PRINT"X=3" 318 RETURN

Program V

when it is used with the keyword ON. This can allow you to overcome some of the problems with both Programs IV and V.

Listing I shows how it can be used.

> 18 REM Listing I 28 N=RND(4) 38 ON N GOSUB 100,250,560,780

Listing I

You could invent your own subroutines to go at lines 100, 250, 560 and 780.

Notice that using this technique allows you to pick on any line number, and not just those which can be calculated easily.

If N is 1 then the subroutine starting at line 100 would be used. For N equal to 2 the

#### From Page 23

program jumps to line 250. while if N is 3 the jump is to line 560, and so on.

Of course the 100, 250, 560 and 780 are just examples.

This technique can greatly help with a mammoth task like writing an adventure program.

Having said that, care must be taken to ensure that there are enough lines to GOSUB to. If line 30 was just:

#### 30 DN N 60SUB 100.258.560

your program would crash if N became 4. The error message would be "ON range at line 30"

If you wanted, it's perfectly in order to have the same line more than once. Line 30 could hecome:

#### 30 ON N GOSUB 100.250.560.250

The RETURN command will still take you back where you started from.

Now you may have heard



some people talk about structured programming. Such people are not very fond of subroutines, and will shake their heads in sorrow if they see one in a program. muttering words like "untidy" or "spaghetti".

They don't like the way subroutines can jump all over the program. Poor programmers tend to use them to get out of tight corners, with almost inevitable incomprehensibility and disaster.

However many home micros have nothing better than GOSUBs, so if you want to write code for different computers you need to get used to the subroutine.

One point in favour of the humble subroutine is that it's possible to transfer subroutines from one program to another. This can really speed up programming.

Also a program that is broken up into sections is more easily understood by other people (such as the editor). Remember that meaninoful variable names will help other people as well.

If you look through the listings printed in Electron User you won't find too many GOSUBs or RETURNs. This is because there is a better and usually faster structure available in BBC Basic called the procedure.

These are a sort of super subroutine, and they will form the basis for a future article.

Finally, despite the dreadful mutterings of its detractors. the subroutine is a powerful structure which can allow you to break your program down into manageable sections.

You could find this advantageous both at the writing and de-bugging stages.

Carefully used, GOSUB can shorten a program, simplify it and make it run faster.

#### ELECTRON, BBC Model B (any OS, BASIC I/II)

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# Software Surgery

THE COLUMN THAT TAKES A LOOK INSIDE THE LATEST RELEASES

Addcomm Vine Micros

AS the name indicates this is a utility program which adds commands to your Electron, giving you, in effect, an even more extended Basic.

It is stored on a ROM chip and to be able to use it you must have a ROM card or box such as the Slogger ROM Box.

The added commands fall into four categories:

- · Graphics.
- Logo graphics.
- Toolkit commands.
   Miscellaneous.

Electron graphics are already superb, but the Addoomm commands make them even better. There are, for example, commands for creating circles and ellipses. They are really easy to use.

For instance:

18 MODES 28 CIRCLE648,512,488

will draw a circle of radius 400 screen units with its centre at the centre of the screen. If you don't like your screen being 1280 units across and 1024 units up, you can scale it.

#### SCALES, 18.8.10

will make the screen 10 units across and 10 units down. To get a similar circle you need:

#### CIRCLES.5.4.

On the scaled screen you cannot use MOVE, DRAW or

# You get a better bit of Basic with Addcomm

PLOT but you can use SMOVE SDRAW and SPLOT.

Any line in a program can mix Basic and Addcomm statements or variables. So:

### CIRCLEX,Y,RND(500)

is quite acceptable. Extra parameters give arcs. If you've eyer envied the

colour fill routines you see in commercial programs it's easy with Addcomm. The statement FILL with X and Y coordinates will fill from the point specified to the edge of the screen or to a non-background colour.
This will fill any shape.

This will till any snape, however complex, even through text. If you fancy patterned filling, CFILL allows you to specify a mix of colours for individual pixels.

It's even possible to have a non-upright screen by using ROTATE, or to shift the whole thing up or to the side with the TRANS command.

Logo graphics give you the

10001M choice1(55)

128nusber X=RND (55)

110FDRselectionI=1T924

1301Fchoicel(number 1) ()8

chance to create displays with minimal use of coordinates. It's rather more like using a

First you decide where to start on the screen [LMOVE]. This sets the position of the Logo cursor.

You choose your PEN (dots, lines or fills) and then the ANGLE to draw and the distance to ADVANCE.

if you prefer relative rather than absolute angles, TURN can be used to rotate a specified number of degrees. LCIRCLE and LELLIPSE draw circles/ellipses or arcs around the Logo cursor.

The Toolkit commands offer a mix of useful and informative commands.

MEM displays in decimal and hex how much memory your program takes and what is spare. This is based on your current mode, so put yourself into the correct mode when using it.

CHAR is a superb com-19MODEL:RX=RND(-TIME):VD

U19:4:8::PRINTTAB(1,18) "Aut

o selection of twenty four

numbers 'TAB(18,13)' for foot

ball pools"TAB(4,28) "Press

space bar to get numbers':R

20DIM CX(55):FORSX=1T024

mand enabling you to design/ edit VDU23 characters. There are dozens of programs which do this, but this one can be used while you're actually writing your program.

GOODPROG attempts to mend a Bad Program, while FKEYS displeys on screen the contents of your function keys. Both work well, and, because Addcomm becomes a part of your computer they sit there waiting to be used in crisis situations.

The same applies to LVAR, which lists all the variable names you've used. This can really help to avoid a muddle.

VERIFY is a facility that was missed out on the Electron. It checks that what has been saved on tape exactly matches the same program in memory.

LLIST is a line listing command. Unlike ordinary LIST, LLIST can be included in a program. Silly? Not at all. My error routine, when debugging programs is now:

ON ERROR
MODE6:REPORT:PRINT\*at
line\*;ERL:LLIST ERL:END

This tells me the error and displays the problem line.

Using FIND it is possible to list the whole program, including the possibility of different list formats such as multistatement lines broken up.

Whenever I program I like to use meaningful variable names. It makes life easier for me, but the computer can handle the resident integer

10REM POOLS SELECTOR
20REM By Rog Frust
30REM
40REM
50MODE1
60FMODE1

70VDU19:4;8; 88PRINTTA8(1,10)\*Auto se lection of twenty four numb ers\*TAB(10,13)\*for football pages\*TAB(4,20)\*Press soac

e bar to get numbers\* 90REPEATUNT!LBET=32:CL5 THEN128

| 440choice%(number%)=number%

150HEXT

150HEXT

170FORprintout%=17055

180FF choice%(printout%) <
>0 PRINT printout%

190NEXT

30NX=RND(55):IFCX(NX)<>8 THEN30 40CX(NX)=NX:NEXT:PRINT':

EPEATUNTILGET=32: CLS

48C1(NX)=NX:NEXT:PRINT': FORPX=1TO55:IF CX(PX)<>8 PR INT PX 58NEXT

Program II: Compacted

Program I: Long pools selector

#### From Page 25

variables (A%-Z%) more quickly and efficiently.

Using the Addcomm command GREPL I can ask for a variable such as pos\_of\_frog and change it right through the program to F%.

SREPL finds each variable you might want to change and then gives you the option to change it or not.

I can now use variables that I understand and when the program is fully de-bugged

change to short fast variables. Not only that, I can use KILLREM to remove all REM lines and then the superb COMPACT to combine lines, thus saving more memory and processing time.

Programs of mine that I have put through the processes save about one third of the original memory — and run more quickly in to the

Programs I and II are identical in what they do (selecting football pool numbers) but Program II has had its variables changed and its REMs removed.

It has then been compacted and renumbered. Table I shows the differences, which are quite dramatic. Imagine the effects on long programs.

So far all has been very good, but three of the miscellaneous commands are dreadful. POPGOS. POPREP and POPFOR allow you to jump out of subroutines, REPEAT/ UNTIL loops and FOR/NEXT loops.

All of these make for very bad programming and should be avoided.

Another command, LGOTO, is like GOTO but instead of jumping to a specified line number you jump to a labet.

It works fine, but so far I've had no particular use for it. SETWIN allows you to predefine seven text windows which can then be called with

the WIN command. It's easier than VDU 28.

The last miscellaneous command is SORT. This can be used to sort string arrays into alphabetical order.

In truth, it actually produces Ascii order with upper case letters before lower case. It's a very fast sort taking just 0.75 seconds to sort 100 words into order.

To sum up, Addcomm is brilliant, particularly the graphics and the toolkit, but there is a small price to pay in terms of memory.

It requires 256 bytes of RAM for its own use and so it pushes page up to &FQQ, If you are going to load a long commerical program it's as well to turn Addcomm off. To do this type ADDCOMM and then hit the Break key. \*FX163 will turn it to nagain.

Firmware like Addcomm requires good documentation, and Vine Micros has achieved a winner here. The 72 page manual is clear, concise and simple giving full syntax and examples for each of the forty commands.

Addcomm is the most valuable piece of software I've got. Every Electron owner who does some programming should consider getting it. It's easily worth the £28.

Rog Frost

# Storm in a micro

Tempest Superior Software

YES, this is the superb arcade game of the same name, converted by Superior Software for the Electron, and released with the full approval

	Program I	Program II
Time taken	2,1 seconds	1.9 seconds
Program length	394 bytes	246 bytes
Variable storage	291 bytes	232 bytes
Spare memory	7763 bytes	7970 bytes





of Atari who created the original.

It involves protecting the universe from aliens who are swarming through the star gates.

Your ship, armed with a blaster and super zapper, can skip round the rim of the star gate in clockwise or anti clockwise directions.

As the flippers, spikers, flipper tankers, fuseballs and pulsars emerge they can be destroyed with a quick spray of missiles from your blaster — well, theoretically anyway, it's not quite so easy in practice.

The allens are semiintelligent and tend to move in your general direction if they can, so you have to watch out for any that make it through the star gate.

If you get in a really tight spot you can use your super zapper which destroys all the aliens in the gate. However it can only be used once per screen.

When most of the aliens have been destroyed your ship enters the star gate to proceed to the next. At this point there may well be several spikers left which must be avoided by blasting a clear route when the message "Avoid Spikes" appears.

There are eight star gate patterns and 255 levels of play. At the start of each game there is the option of one or two players and any odd numbered star gate can be selected.

The sound and graphics are excellent and it's quite an exciting game to play. Also it is quite an original idea.

My only criticism is that there isn't a high score table or a joystick option — but it is compatible with both Plus 1 and 3

Arcade fans will thoroughly enjoy this classic.

**Roland Waddilove** 

# Don't mind if I do...

The Complete Cocktail Maker Acornsoft

ONE of the main uses of home computers, apart from alien zapping, is the storage and retrieval of information in databases.

These can be based on any topic and The Complete Cocktail Maker is a database concerned with that complex set of drinks.

It contains information on over 300 with details of how much of each ingredient is needed.

Not only that, but it tells you how to mix them and what type of glass to serve them in.

On loading you are presented with the command menu which gives you four options.

Browse allows you to look through all the recipes in alphabetical order. For each drink you are given the liqueur flavour needed, the spirit required as well as any other ingredients.

The recipe also suggests what decarations to use and the mixing method. A picture is drawn of the type of glass to use which also gives some idea of the final colour of the drink.

Option two is A Drink Containing. You specify which ingredients you want, chosen from four different lists. Any cocktail containing your specified substances is then displayed on the screen.

In the event of none being found the program reverts to Browse mode.

A Drink Made Using sounds



almost identical, but in fact means that not all of the ingredients have to be used in the cocktails.

You could enter the entire stock of your drinks cabinet and find all the cocktails you could make.

The final option allows you to enter the name of a cocktail and the computer will display its recipe. It you enter part of the name all drinks containing the latters you entered will be found.

The program comes with a 12 page booket which explains clearly how to use the program. The whole package is well produced and, if you are into cocktails, it's very useful.

The trouble is, it contains no samples.

Rog Frost

# Grovel before go

Twin Kingdom Valley
Bug-Byte

THIS graphical adventure combines some of the better elements of monster-bashing with the puzzles usually associated with text-only adventures.

There are 175 "pictures" in the adventure and since you can "look" at some of the objects within the locations this leads me to assume there are about 160 actual

locations.

You play the typical greedy dyour quest is to collect all the treasure you can find and deposit it safely. When you've scored the maximum points of 1024 you will find that you have a further problem. What to do next.

The program loads in several parts and full instructions are given during loading.

When the adventure starts you're asked to choose one of six options. These determine whether you have the graphics displayed or not and the type of messages you want about your location.

You can alter these during the course of the game by typing OPTION. As soon as you have made your choice the adventure proper begins.

You find yourself on a road outside a cabin. Inside the cabin are three objects that will come in handy.

At this point I would suggest you save the game, as should you die the program simply ends.

If you have a game saved you can restart by using \*LOAD, otherwise you have to load the game back in from the start.

I think it quite inexcusable for Bug-Byte not to have given you the option of playing another game. On saving the game, using "SAVE, you will see that you're in fact saving three programs, one of which is 24 blocks long.

Anyway, back to the game.

You'll find that over 100 locations are readily accessible and are generally local.

For example, moving North and then South brings you back to the location you started from, However, this isn't allways the case, especially when underground.

so making a map is a must. You will meet various characters most of whom, if armed, will attack you on sight.

An elf will carry things for you but is sometimes reluctant to let you have them back. This same elf is also a positive nuisance when mapping underground – he kept picking up the objects I was droppin in order to make my mapi

It is possible to frighten off or kill the characters you meet but you need to be at maximum strength (190 points) and armed with a better weapon than them.

This is also a good way of obtaining any treasure they may be carrying since they quite often drop them if you are winning.

Watch out for your strength points after doing battle, they will be very low and any further combet will probably finish you off.

A good tip if your strength is low is to WAIT for a bit since every command you give builds up your strength. If you are near Watersmeet a quick dip will work wonders.

On the subject of strength points, don't drink too much

ale in the local inn - it's definitely not good for you.

The graphics are excellent and quickly drawn but tend to slow the game down a lot, so doubtless you'll do the same as me and use the Option command to turn them off.

I've mapped about 140 locations and collected a few treasures but frankly, I don't think I'm nearer to finishing than when I started.

I've tried giving the crystal ball to the castle witch but keep getting killed.

I've tried throwing water, oil and everything else at the dragon but still can't get the master key.

I'm afraid that the adventure doesn't generate enough atmosphere for me to want to persevere with it.

Having said that, if anyone has completed it and would like to send me a map of it I will mention them in my bedtime prayers.

Overall, Twin Kingdom Valley is impressive. It is extremely well programmed and packaged. However, the save game facility and the abrupt ending, along with the characters in the program, who are more of an impediment than a problem, tend to make me reluctant to recommend it.

Yet the mail I've received about it tends to indicate that a lot of people do like it. My advice therefore, is to go to your friendly computer dealer, grovel and try before you buy!

Merlin

# Deft fingers the key in Free Fall

Free Fall Acornsoft

THE story line goes "When the Alphold battleship attacked Deep Space Station Coriolis and Alphoid life forms injected the air supplies with their own cyanide-based atmosphere, only one crew member managed to don his space suit in time.

"Unable to reach the Alphoid warriors barehanded to defend not only his own life but also the viral computer records which the Space Station contains".

The object of Free Fall is to control that sole crewman to help him survive as long as

possible and to kill as many Alphoids as he can. It sounds easy.

However there are a few nasty creatures lurking around bent on getting our lone spaceman — the Craboids, Lobstoids, Batoids and Waspoids.

Craboids are pleasant little creatures that will bite through a space suit and poison the occupant with a nerve toxin. As you might guess, this causes our spaceman to lose all control and to thrash about with convulsions.

As light relief, Lobstolds breathe fire and use up the oxygen supply. They also burn whoever comes in range.

The Batoids are nice fellows who fly around catching and

throwing bombs.

Last, but far from least, the deadliest of them all are the Waspoids. "They have a sting which is worse than the bite of a Craboid, they can breathe fire like the Lobstoid and they can fly as well as a Batoid".

To control the spaceman requires dexterity of three fingers on each hand and a thumb for the space bar.

Catching a bomb requires another finger. This might sound a bit difficult, but the keys are well positioned and control is soon gained.

Several features are so good that, hopefully, they'll become standard on all games.

There are two panic buttons that can be operated at any

time. (I did. Often!) The Escape key causes the game to be aborted and the program restarted, while the Copy key is used to hold the game. This can be for an indefinite time, the Delete key being used to restart the action.

Sound can be switched on or switched off at any stage.

One excellent aspect of this program is the screen display. Not only are the characters and their movement of a high standard but there are also displays showing heart rate, air supply, high score and present score.

I thoroughly enjoyed getting to grips with this value for money package, Recommended.

John Woollard

# BOOK SHELF



# How Basic really works

Basic Rom User Guide for the BBC Microcomputer and the Acorn Electron, by Mark Plumbley (Adder Publishing, Cambridge)

THE Basic ROM User Guide is designed to cover one area of computer technology that is frequently ignored – the Basic ROM. This book is therefore extremely useful if you want to find out how your computer really works.

You may not know it, but Basic is a computer program. Its purpose in life is to convert the programs you write into machine code. Basic is stored in a ROM chip so that it is available as soon as you switch on your machine.

It is an extremely complex program and includes all of the functions, statements, error handling routines and commands that you can use in your programs.

This book succeeds in describing that complex process in clearly-explained units. It begins with a brief introduction to machine code programming and a description of the 6502 microprocessor.

This section includes an outline of the instruction set and registers.

The Guide then moves straight into the task of explaining the structure of the Basic program, which is treated as a system.

The comprehensive glossary of terms at the back of the book is extremely useful. In addition there is an extensive index so cross-referencing and tinding one's way around the book is relatively easy.

As I read further and further into the book I became more tempted to try things out. It certainly does encourage exploration and self-awareness – there are a lot of examples and programs to illustrate the text.

I kept discovering new and useful short-cuts to my programming and techniques to improve my old programs.

However, there is one serious drawback to using the facilities of the Basic ROM directly and not through the usual \*FX calls – the programs may not be transferable from one machine to another.

The book does list the differences between BBC Basic I, BBC Basic II and Electron Basic.

If you are writing for your machine only, then there is no problem. But, if the program is to be transferred to another machine, then problems may easily arise.

This text provides a very useful handbook for the advanced programmer and a useful guide to those who wish to find out more about their computer.

It contains listings for a complete disassembler and a very useful routine for recovering "bad programs". The section on error analysis and recovery after an error is most enlightening.

In all, this book fills a gap left by many user guides and texts on the Acorn range of computers.

John Woollard

# **INSIDE ADVENTURES**

How to Write Adventure Games for the BBC Micro and Electron, by Peter Killworth (Penguin Acom Computer Library)

AS you sit at your micro in the early hours of the morning, puzzling over some tricky problem in the latest adventure from your favourite software house, do you ever wonder what is going on in the mind of the programmer?

Well, here's a book written by Acornsoft's top adventure writer, Peter Killworth.

After a brief introduction to adventuring, the author starts with a discussion of how the games are written.

The best way to explain any problem is by example, so three adventures are created and their development discussed in detail.

"Caves" involvés exploring a random network of caves and passages, searching for treasure. "Mini" is an adventure with only four rooms and is surprisingly complex. "Roman" is a larger, more-involved adventure, set in Ancient Roma.

The reader is taken through each stage, step by step. First the plot needs to be outlined, then the game logic worked out before any code is written.

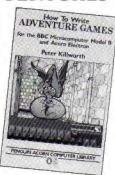
The most complicated and difficult part of the program is the database for storing the location of the objects, rooms and occurants.

A great deal of time is spent looking at this to try to find the most efficient way of storing the data.

I had to read through the text several times before I even remotely understood how the author was storing and retrieving the information.

It's amazing how much information Mr Killworth can cram into a few simple variables. Every bit is significant and often shows whether something exists, or is possible, or present, and so on.

"Mini" is an adventure with



only four locations, but is packed full of puzzles, messages, objects and magic words

This is an excellent, typical adventure. Don't be put off by the number of rooms, this is irrelevent. It's the structure that is important.

Chapter five describes how an advanced database is constructed and a program which can be used by the reader to construct a database for his own adventures is presented.

The program enables you to enter the objects, rooms and vocabulary for the adventure and then stores it in the most efficient way.

The following chapter develops routines for extracting the information from the database, using "Roman" as an example.

Finally there is a complete listing of the adventure "Roman".

This is an excellent book from a superb programmer which gives an insight into how adventures are constructed. It's not an easy text to follow, so I can only recommend it to advanced programmers or those wanting an intellectual challenge.

If you have written a few simple adventures and want to know how the professionals do it, then this book is definitely for you.

Roland Waddilove

The ultimate guide to the Electron!

Mark Holmes & Adrian Dickens

This detailed guide to the Electron's operating system is a must for every serious Electron user.

In its information packed pages you'll find:

★ Full details of how to implement the powerful \*FX/OSBYTE calls.

- Page ROMs revealed: The way they work and how to write your own.
- ★ Programming the ULA
   all you need to know.
- Full coverage of memory allocation and usage – make every byte count.
- ★ Complete circuit diagram: How to use the Electron's exciting expansion capabilities to the full.

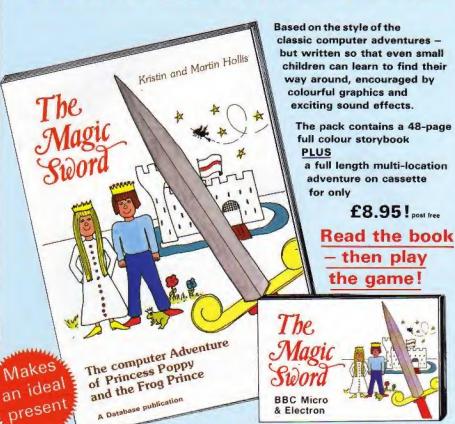
and much, much more . . .

Quite simply, the Electron Advanced User Guide is the essential guide to exploiting the full potential of the Electron.

Make sure of your copy.

Please send me a copy of Acorn Electron Advanced User Guide, £9.45 (including p&n)  Payment: please indicate method ( / l	NameSignedAddress	
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Barclaycand/Vise  No	Don't forget to quote your credit card number and give your full address.  You can also order 900 C4 hours	171

# You're never too young to play a Magical Adventure on the BBC Micro or Electron!



Please send me the complete Magic Sword pack containing storybook and cassette to:  Name	<ul><li>I enclose my cheque for £8.95 payable to Database Publications</li><li>□ Or debit my Access/Visa card:</li></ul>
Address	No

# 

IT would seem from previous editions of Electron User that text scrolling programs are very popular. Two have been published, both written in Basic.

This bowever is a major drawback, for string manipulation in Basic is a cumhersome process.

To illustrate my point take a look at Program I. Its objective

```
18 REM PROGRAM I
   28 REM BASIC STRING HAND
LING
   38 MODE6
   48 AS="ELECTRON USER"
   50 PRINTTAB(18,18);A$
   68 As=LEFT$ (As, 3)+CHR$32
+RIGHTS (As. 9)
   70 PRINTTAB(10.11):A$
```

#### Program I

is simple, to take a string and replace its third character with

Just look at line 60. As well as cumbersome this process is climas

What is needed is an easy

way to manipulate strings. A better approach is to find

STEPHEN MARTIN shows how string manipulation can be made much easier - and at the same time much more efficient

```
18 REH PROGRAM II
   28 REM ALTERNATIVE STRIN
6 STORAGE
   38 MODE6
   48 DIM string% 13
   58 *stringI="ELECTRON US
   40 PRINTTAB(10,18);$stri
ng%
   78 string173=32
   88 PRINTTAB(18.11): $stri
ngi
```

Program II

an atternative way of storing the string in memory which will allow us to manipulate it in such a way that we can examine and change individual characters within it.

This is easily accomplished as Program II shows. It works like this:

Line 40 reserves space in memory for string. It has to be the exact length of the string.

Line 50 places the string in memory and line 60 prints it. Line 70 places CHR\$32 at position 3 in the string.

This program produces

```
IR REM PROGRAM III
28 REM TEXT SCROLLER
                             around.
38 HODES
```

35 VDU23.1.0:0:0:0:0: 48 DIM string% 14 50 \$string1=" ELECTRON U

SER" 68 PRINTTAB(18,18); \*stri

nel 70 TEMP=string170 80 FORT=0TO13 98 string%?T=string%?(T+

11 100 NEXT 118 string%?13=TEMP 120 BOT050

Program III

exactly the same effect as Program I but it is simpler and much faster.

We can now construct a program using this technique which will scroll text across the screen. Look at Program III. Line 40 reserves space for the string and 50 puts the string in memory.

Line 70 stores the first character and 80, 90 and 100 swap memory locations to produce scroll,

Line 110 puts the stored character at the end of the string to produce the wrap

Program III is probably the most efficient you can make it using Basic.

For even greater speed you need to use machine code. Fortunately this type of string storage and manipulation requiring repeated swopping and changing of memory locations is ideal for programming in machine code.

Program IV shows you how. It also demonstrates how to display part of the string so you can have a string of 100 characters long displaying 10 characters at a time on the screen.

```
IEREM PROGRAM IV
   20REM MACHINE CODE SCROL
LER
   38HODE4
   ADAKEYIBO. IMBUNIN
   50V0U23,1;0;0;0;0;
   6001M string% 40
   78$string%=" MACHINE COD
E SCROLLER BY STEPHEN MARTI
   8@new=string%
   98start=string%+1
  188nun=48
  11@PROCassesble
  128CLS
  130PRINTTAB (9.5) "MACHINE
CODE SCROLLER*
  148PRINTTAB(14,18) "WHICH
  150PRINTTAB(16, 12)*1 OR 2
```

```
160REPEAT: AS=GETS
  178UNTIL A$="1" OR A$="2"
  1801FAs="1"PROCdemp1 ELSE
 PROCidenc?
  190DEFPROCdemoi
  200CLS
  218PRINTTAB(15.28) "FAST E
H!*
  228PRINTTAB(15,22)"IT SAY
  238PRINTTAB(9,6) "PRESS BR
FAK FOR HENU"
  248PRINTTAB(0,24); $string
  250PRINTTAB(8,18); $string
  260CALL RX
  2786070250
  280DEFPROCHEMO2
  299CLS
```

388PRINTTAB(18,6) "PRESS B

450LDX#8 45BLDA new 478STAL78 489.LOOP 498LDA start.X 500STA new.X SERINX 570CPX#nue STUBBLE LOOP 548LDA&78 550STA stringI+num-1 56BRTS 5781 5BBENDPROC

This listing is included in this month's cassette tape offer. See order form on Page 61.

### **By MARK JOHNSON**

ESMERALDER, the cook's help, has been the baron's favourite for a long time, but after her latest lunchtime offering of a burnt boiled egg she is out of favour.

The wicked baron has punished her by locking her in the tower

She is destined to be there for a long time, so undaunted you have scaled the castle wall in order to reach her and carry her away to safety.

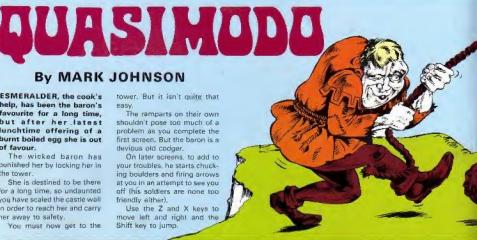
You must now get to the

tower. But it isn't quite that

The remparts on their own shouldn't pose too much of a problem as you complete the first screen. But the baron is a devious old codger.

On later screens, to add to your troubles, he starts chucking boulders and firing arrows at you in an attempt to see you off this soldiers are none too friendly either),

Use the Z and X keys to move left and right and the Shift key to jump.



#### Quasimodo listing

- 4 REM QUASIMODO
- 5 REM (C) Electron User
- & REM BY MARK JOHNSON
- 18 HSC=1888
- 28 DNERROR SOTO38
- 38 MODE1: VDU23.1:8:0:0:0
- 48 COLOURI31:CLS
- 58 COLDURI: PRINTTAB(15,2 "QUASIMODO"

68 PRINTTAB(15,3)

78 COLOURS: PRINT "You au st jump the ramparts ,quard s,rocksand arrows to rescue Esmeralder!"

88 PRINT "SPC5"KEYS.. "" SPC15"Z..LEFT" "SPC15"X..RI SHT"''SPC12"SHIFT...TO JUM

98 PRINTTAB (5,22) WRITTE N BY. . MARK JOHNSON"

100 VOU4: COLOUR1: PRINTTAB (8.26) "CHOOSE WHICH SCREEN.

118 PRINTTAB(9,28) 1.. EAS Y TO 3. . HARD"

120 PRINTTAB(14,38) "SCREE N?": REPEAT UNTIL GET(>FALSE : IF GET<49 OR GET>51 GOTO 1 20 ELSE SCN=GET-48: COLOURS

138 HODES: COLOUR131: COLOU R8: CLS: VDU23, 1; 0; 8; 0; 0; PRIN TTAB(4.15) \*SET READY!!!\*

140 FOR N=0 TO 2000: NEXT: PROCTUNE: CLS

150 PROCINITIAL

168 PROCSCREEN

170 REPEAT

188 IF INKEY (-98) AND X>8 THEN SOUNDO, -15,50,1:COLOUR B: PRINTTAB (X.Y) SPACE \$: X=X-1 :PRINTTAB(X.Y):MAN2\$

198 IF INKEY (-1) AND RIGHT =TRUE AND X<17 THEN COLOUR® PROCHANJUMPRIGHT ELSE IF I NKEY (-1) AND Y=13 AND RIGHT \*FALSE THEN SOUNDI,1,20,5:C OLOURA: PROCJUMP

288 IF INKEY (-67) AND X<1 9 THEN SOUND8,-15,58,1:COLO URBIPRINTTAB(I.Y) SPACE\$: X=X +1:PRINTTAB(X,Y)MAN2::RIGHT \*TRUE ELSE RIGHT=FALSE

218 FOR V=8 TO LEVEL+2:NE

228 IF ARM1=TRUE THEN PRO CARMNOVE

238 IF ARM=TRUE AND RND(L EVEL+4)=1 AND ARWICTRUE TH EN ARMI=TRUE: SOUNDB. 1.88.3

248 IF SCN)1 AND RND (LEVE L#4)=1 AND ROCK(>TRUE THEN ROCK=TRUE: SOUND8.1,208,3

250 IF ROCK=TRUE THEN PRI MTTAB(ROK,11);ROK\*:ROK=ROK+

268 IF ROK=18 THEN PRINTT AB(ROK,11); ": ROK=0: ROCK=

278 IF X=ROK+1 AND Y<>13 THEN PRINTIAB(ROK. 18) " ":P ROCDEAD

288 IF Yall THEN SCHESCHA 1: X=0: SC=SC+BONUS: PROCSCREE

298 IF GUARDS=TRUE THEN P ROCGUARDS

300 COLOURO: PRINTTAB (X.Y)

318 IF X=4 OR X=5 OR X=8 OR X=9 OR X=12 OR X=13 OR X =16 OR X=17 AND Y=13 THEN P POCREAR

320 IF LIVESCL THEN GOTOS

338 IF Y(13THEN PRINTTABL Y. YI SPACES: Y=Y+1

340 IF V=13 AND A=Y THEN PRINTTAB(X,Y)SPACES: PROCDEA

350 IF BONUS (18 THEN BONU S=SCN+400: PROCDEAD

348 BONUS=BONUS-18

378 COLOURS: PRINTTAB(8.27 ) BONUS PRINTTABIO, 281 BON

388 COLDURG: PRINTTAB(15.2 7) "SCORE": PRINTTAB(15,28); S

398 FOR F=1TOLIVES: COLDUR 8: PRINTTAB (F. 4) MARS; CHR\$10; SPACES: NEXT

> 400 UNTIL FALSE 410 DEFPROCINITIAL

428 \*FX11.4

438 VDU23,1,8;8;8;

448 VDU19, 2,618;

458 VDU19.8.4:8:

460 ENVELOPE1.0.1.-1.0.20 .20, 0, 126, 0, 0, -126, 126, 126

478 ENVELOPE2, 1, 8, 8, 8, 58, 25, 25, 127, -1, -1, -1, 126, 90 480 LEVEL=6: ROK=0: ROCK=FA

LSE: GUP=TRUE: LIVES=3: X=8: Y= 13:A=16:8=13:8C=B 490 RIGHT=FALSE: ARM1=FALS

E: BUARDS=FALSE: HIT=FALSE: AR W=FALSE: BELL=TRUE: ESM=FALSE 508 MANS=CHR\$17+CHR\$1+CHR \$145+CHR\$11+CHR\$8+CHR\$17+CH R\$8+CHR\$144

518 MAN2\$=CHR\$17+CHR\$1+CH R\$152+CHR\$11+CHR\$8+CHR\$17+C HRSB+CHR\$144

528 BRD\$=CHR\$[47+CHR\$1]+C HR\$8+CHR\$146

538 ESM\$=CHR\$149+CHR\$11+C HR\$8+CHR\$148

548 BELS=CHR\$158

550 ARW\$#CHR\$151+CHR\$32+C HRETT

5AB ROK\$=CHR\$32+CHR\$154

578 SPACE\$=CHR\$32+CHR\$11+

CHR\$B+CHR\$32 580 VDU23,144,8,28,58,52, 126,250,248,248

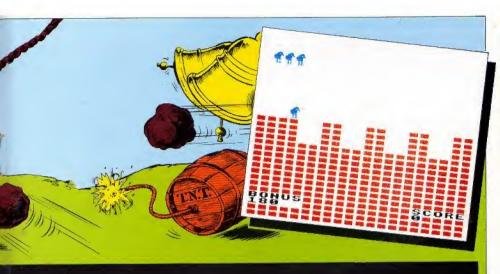
590 VDU23,145,248,248,120

.40.48.48.48.68 600 VDU23,146,24,68,126,1

82.66.66.255.255 610 VDU23,147,255,255,255

.126.126.182.182.231

628 YDU23,148,8,60,68,188



.68.28.28.38

638 VDU23.149.56.248.56.5 6,124,254,254,68

64B VDU23, 150, 16, 56, 56, 56 ,124,254,254,16

658 VDU23, 151, 0, 1, 66, 255,

66.1.8.8 660 VDU23, 152, 248, 248, 126

,34,34,34,67,64 678 VDU23.153.255.129.129

.129,129,129,129,255

688 VDU23, 154, 8, 68, 126, 25

5.255.126.60.0

698 ENDPROC

700 DEFPROCSCREEN

718 IF SCN=2 OR SCN=3 THE N SOUND1,2,148,8:SOUND1,2,1 58.4

728 IF SCH=4 THEN PROCESM TUNE: FOR J=0102000: NEXT

730 CLS

748 COLOURS: COLOUR129: PRI NTTAB(8.15)::FOR F=8 TO 339 : VDU153: NEXT

750 FOR N=14T017:FOR F=4 TO17STEP4: COLOUR131: PRINTTA B(F.N): ": NEXTF: NEXTN

768 IF SCN()4 THEN BONUS= SCN+488

770 IF SCN=1 THEN BOTD810 780 IF SCN=2 THEN GUARDS=

TRUE: GOTO BIB 798 IF SCN=3 THEN GUARDS= TRUE: BELL = FALSE: ARW = TRUE: ES N=TRUE: SOTO828

800 IF SCH=4 THEN SCH=1: A

RW=FALSE: SUARDS=FALSE: LEVEL =LEVEL-1:80NUS=SCN\*500:LIVE S=LIVES+.5

818 COLOUR2: PRINTTAB (19.1 8): BELS: IF LEVEL(1 THEN LEV EL=1: ENDPROC ELSE ENDPROC

828 IF ESM=TRUE COLOUR2: PRINTTAB(19.5):ESM\$:COLDURI 29: COLOURS: PRINTTAB(18.6):C HR\$153+CHR\$153+CHR\$8+CHR\$18 +CHR\$153: COLOUR131

838 ENDEROC

848 DEFPROCHANJUMPRIGHT

858 SDUND1,1,8,18

860 PRINTTAB(K.Y): SPACES: Y=Y-1:PRINTTAB(X,Y):MAN2\$:P RINTTAB(X.Y): SPACE\$: X=X+1:P RINTTAB(X.Y) MANS: PRINTTAB(X .YI: SPACE : X=X+1: PRINTTAB(X .Y) MAN25: PRINTTAB(X,Y): SPAC ES

878 IF SCN)1 AND X>4 AND [6=Y OR 6=Y+1 OR 6=Y-1] THEM PROCDEAD

988 ENDPROC

898 PRINTTAB(2,18) "G A H E 0 V E R": FOR F=0 TO 2500 THEXT

988 COLOURI: CLS: PRINT'''S PC5"QUASIMODO"

918 COLDURB: PRINT" "H 1 6 SCORES"

928 IF SCHEC THEN HSC=SC 938 PRINT "SPC3"HIGH SCOR E=": HSC

940 PRINT 'SPC3"YDUR SCOR

E=4:SC

958 PRINTTABIS, 38) "PRESS SPACE"

968 #FX15,8

978 REPEAT UNTIL GET=32

SECTOR SEC

998 DEFPROCSUARDS

1888 PRINTTAB(4,6)SPACE\$1P RINTTAB(8.6) SPACES: PRINTTAB (12,6) SPACE \$: PRINTTAB(16.6) CPACES.

1818 IF GUP=TRUE THEN 6=6-

1020 IF GUP=FALSE THEN B=G +1

1838 IF G=17THEN BUP=TRUE

1848 IF G=11 THEN GUP=FALS

1050 COLOURS: PRINTTAB(4.6) BRDS: PRINTTAB(B.G) BRDS: PRIN TTAB(12.6) GRD\$: PRINTTAB(16. G) GRD\$

1840 ENDPROC

1878 DEFPROCARMHOVE

1888 PRINTTAB(A.13) ARWS

1898 A=A-1 1180 IF A=8 THEN PRINTTAB

8,13) \* ": ARW1=FALSE: A=17 1110 ENDPROC

1120 DEFPROCDEAD 1138 LIVES=LIVES-1: FOR F=4 TO7: SOUNDO.-15.F.2: NEXT: FOR

F=8T0580: NEXT: PRINTTAB(X, Y ) SPACE\$: X=8: Y=13: BONUS=9CN\* 500

114B ENDPROC

IISB DEFPROCJUMP

IIAB PRINTTAB(K.Y)SPACE\$1Y =Y-1;PRINTTAB(X,Y)MANS:PRIN TTAB(I,Y)SPACE\$:Y=Y-1:PRINT TAB(X,Y) MANS: PRINTTAB(X,Y)S PACES: Y=Y-L: PRINTTAB(X,Y)MA NS: PRINTTAB(X,Y) SPACES: Y=Y-

1178 IF YKE THEN Y=B

LIBO ENDPROC

1198 DEFPROCESHTUNE: RESTOR E1248

1200 FOR Q=1 TOIR: READAS, I :SOUND1,-15,AS+2B, I:NEXTO:E NUPROC

1210 DEFPROCTUNE

1220 RESTORE1230: FOR Q=1TO 14: READZ. V: SOUND1. -15. Z-30. V: NEXTO: ENDPROC

1230 DATA48,3,44,3,48,3,52 ,3,48,3,44,3,48,3,52,3,48,3 ,44,3,48,3,52,3,48,8,34,7

1248 DATA38, 18, 48, 7, 58, 5, 4 8,18,38,7,38,4,48,5,62,6,69

,4,62,6 1258 IF ERR=17 THEN GOTO 4 @ ELSE MODEA: REPORT: PRINT E

RL: #FX12.8

This listing is included in this month's cassette tape offer. See order form on Page 61.

# **QUICK TO LEAF**

THAT'S...

# FFICE

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DATABASE SOFTWARE



#### THERE'S a definite trend towards multiple statements and/or graphics in adventures these days.

Does anyone use multiple statements? Do graphics really promote an atmosphere or are they just a nuisance? Is it true that anything new has to be good? Who knows what can come out of it – From big Acorns do little Electrons grow and all that!

Personally I prefer to turn the graphics off when possible, once I've seen them. The game usually progresses faster and adventures without them are often better as they have to use the memory better. What do you think?

On to the adventure Top Ten. So far we have received marks from lots of people, but, emazingly, for only four different adventures.

Please give marks for them all, not just the ones you like best. If you think the program is dire, then mark it accordingly. So get your pen and paper out.

paper out.
I'd like to thank everyone who wrote in with answers to last month's problems. In particular Mark Steadman and Phillip Cook. I would also like to thank Michael Dunlop and Katy King for their advice and opinions. It's nice to hear what you think about adventures as well as where they are causing you problems.

Andrew Dickman writes to say that he can't even get into

the castle in **Sadim Castle**. I have to presume that he means the gates that you can see when the game starts.

These are the gates to the castle grounds, not the castle as such. Fix the farmer's roof and do a deal with the monk.

Brynn Edmondson is stuck in *Eye of Zoltan*. He wants to know what the password is for getting into the castle. Password IS the password!

HE is also stuck in The Incredible Hulk. He wants to know how to get rid of the bees and get the wax. One of the domes is worth EXAMining if you are a Scott Adams FAN1

John Miloren is having problems with Wheel of Fortune. Can you put things into the empty basket? No. Something will put itself in later.

How do you befriend the farmer, troll, spider and fly? Later. You can't. Bring it something it likes. You don't want to.

Go into the fly's cave and immediately out and into the spider's cave

spider's cave.
Can you stop the trapdoor from closing? No. no need to.

Where do the characters all go to when you come back up through the trapdoor? The policeman continues his beat on the other side of the canal and the tramp goes home for his rea.

How do you go down the well the second time? You

don't. Try spinning something.

How do you get across the canal bridge? From the other side!

David Yates has written to say that if you type in EAT SPICES in Sphinx Adventure, the program crashes with a "BAD ARGUMENTS AT LINE 363" message. You have been warned.

Now some problems I need help with:

J.E. Squire wants to know what, if anything, can be done in the inner sanctum and what is the significance of DAVE KNEW in Sphinx Adventure.

H. Bastein is having problems in **Strange Odessey**. How does he get to the Jovian Mine without getting squashed and into the Black Hole without getting ripped apart?

Terry Mealing wants to know where some of the jewels are in *Crown Jewels* — and I want to know who produces Crown Jewels, as I've never heard of it!

I have been taken to task by P. Eastwood for not finding the treasure in my review of Java Star. Apparently the treasure is easy to find and I must be stupid for missing it.

Some late news is that Epic has produced help sheets for all of its adventures and they are free to anyone sending an SAE – to Epic, NOT to me.

In view of the vast numbers of letters I am gettling about Twin Kingdom Valley, I am going to do a special on it next

Yes, I finally dug my old maps out and went back and solved it. For those of you who are wondering what to do with your 1024 points, watch this space.

Now, let's get back to answering some more readers' questions:

C.F. Dodds can't get off the beach in Softek's **Eye of Zoltan:** If you have mapped everywhere, use your treasures before you STORE them.

Terry Mealing wants to know how to get both the sword and the key box in Stolen Lamp - DON'T.

Nicola King, Chris Wilson, R. Henderson and H. Bastien are all having problems with Twin Kingdom Valley.

To kill the dragon, one of the things you find in the castle should be examined carefully—it looks deadly. To get out of the maze with the witch, you need to bribe a guard with a bag of gold.

The glant is in the desert king's dungeon and so is the princess. Get there from the cave near watersmeet.

You can't do anything with the secret of life until you have done everything else. To help the sick giant, take him to watersmeet.

The master key will open just about anything, but the door to the south turret in particular. The rod isn't that much use, although waving it will bridge a gap.

Gordon Hoy and David Yates are having fun with Sphinx Adventure.

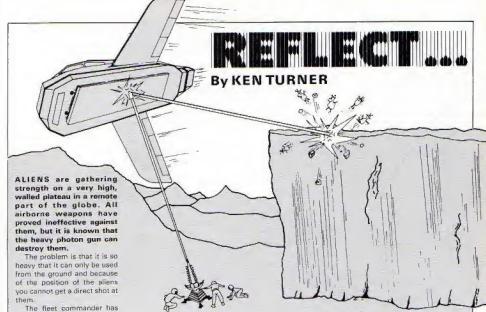
The mithril ring and stake are both across the everglades past the crocodile. If the sword breaks, then use your hands when trying to kill the dragon and the ogre.

The safe door doesn't need keys, only a magic word, and the boat and mouse are in the vampire's castle. You will need to map the maze of coloured rooms and metal passages and junctions. Sorry!

If you want Merlin's help write to:

Merlin, Electron User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

- and enclose an SAE if you would like a reply.



come up with a brilliant but dangerous solution by fitting the remaining airships with reflective material on the base.

The brave pilots have put their lives on the line by flying back and forth over the alien's position to provide you with a mirror to fire at and thereby reflect your photons on to the

If you miss the mirror and hit the ship it will be destroyed

YP%

Xbomb

Yhomb

XSHIP

XBAD

BAD%

diffx

diffy

- and you only have five of them.

Every now and then the atiens launch a bomb which bursts above you and showers you with high explosive minibombs.

While in flight this bomb also disables your oun - most frustrating, but this is what we learn to live with in computer-Ibnel

In order to score you have to position your "sight" so that the photon hits the mirror on the airship and the reflected chotons meet the alien.

The sight is a "+" at the top of the screen and is the point through which your photons will pass if not interrupted by the mirror.

Once fired, the photon's path is set and cannot be changed - it cannot be guided. As both the ship and the

alien are always moving a hit with every shot would be miraculous

For this reason there are no levels, and the idea is to score more hits than anyone else before you are killed.

#### VARIABLES

X coordinate of sight. XS%

XB% X coordinate of base. XP%

X coordinate of photon.

Y coordinate of photon.

X coordinate of bomb.

Y coordinate of bomb.

X coordinate of ship. X coordinate of alien.

Movement rate of alien.

Horizontal movement rate of photon.

Vertical movement rate of photon.

SHIP% Movement rate of ship.

score% Current score.

Lives left. lives%

Random time before bomb is launched. time

#### FLAGS

launched dead% photon

Has bomb been launched? Is game finished? Has photon gun been fired?

#### ARRAYS

X(12),Y(12) Coordinates for shower bombs.

name\$(10) Names on hi-score table. score(10) Their scores.

#### PROCEDURES

**PROCscreen** Draws battle scene, score etc. VDU 23s, initialises variables. **PROCinit** 

**PROCship** Creates new ship.

**PROChaddy** Creates new alien. **PROCmoveship** Moves ship.

PROCmovebaddy Moves alien. Moves sight on your command. **PROCmovesight** 

**PROChase** Creates base.

**PROCmovebase** Moves base on your command.

Photon launched, sound, flight until result **PROCphoton** 

Rubs out what was hit and shows **PROCexpl** 

explosion.

**PROCscore** Increments score.

After random time, called to launch bomb. PROChomb Bomb bursts and showers down mini-**PROCshower** hombs.

**PROChiscore** Compares score with previous scores. **PROCtable** If hi-score asks for name and displays

Displays instructions. **PROCinstruct** 

**PROCerror** Calls Mode 6 and reports error.

#### From Page 37

- 18 REH REFLECT
- 15 REM (C) Electron User
- 28 REM By K.B. Turner
- 25 ON ERROR: MODE 6: PROCE
- 38 DIN X(12) . Y(12) : Y(1) =
- 48 DIM names (18), score (1
- 45 ENVELOPE 1.1.5.5.5.12 ,12,12,126,0,0,-126,126,126
- 46 ENVELOPE 2.1,-5,-5,-5 ,12,12,12,126,0,0,-126,126,
- 126

FEORTEND

- 50 FOR S=1 TO 18 68 names (S) = "Electron":s core(S)=8
- 78 NEXT
- 75 MODE 6: VDU 19.1.218:
- 76 PROCinstruct
- 77 HODE 5
- 79 PROCinit
- 88 VDU 23,1,8;8;8;8; 98 VOU 5
- 188 PROCecreen
- 118 PROCehio
- 128 PROChaddy
- 138 PROChase 148 VDU 41CLS
- 150 MOVE 700, 180: GCOL0, 3: FOR C=100 TO 180:PLDT77.700
- .C: NEXT 160 MOVE 636,180:5COL0,1: DRAW 1279.188: DRAW 1279.288 : DRAW 636,288: DRAW 636,188
- 170 VOU 5
- 188 HOVE 8.8: GCOLE. 1: DRAW 8.1023: DRAW 1279.1023: DRAW
- 1279.8: DRAW 8.8
- 185 PROCecore 198 REPEAT
- 200 PROCeavesight
- 218 PROCequeship
- 228 PROCegvebaddy
- 238 PROCeovebase 248 IF INKEY (-99) THEN p
- hoton=TRUE: XPX=XBX+32:diffx =(1XSZ+32-XPX1+58)/708: MOVE XPX, YPX: GCGL3, 1: DRAW XPX+d iffx, YPI+diffy
- 250 IF photon THEN SOUND 1.1.0.8: REPEAT: PROCphoton: P ROCmovesight:PROCmoveship:P ROCeovebaddy: PROCeovebase: U NTIL photon=FALSE
  - 260 PROCECORE
  - 288 IF TIME>time THEN lau

- nched=TRUE: Xbomb=XBAD: Ybomb =464: NOVE Xbook, Ybook: 600L3 3: PRINTCHR#245
- 298 IF launched THEN REPE AT:PROCbook:PROCoovesight:P ROCeoveship: PROCeovebaddy: P ROCenvebase: UNTIL Y(1)(188 OR dead%: TIME=8: time=RND(88 80):Y(1)=288:Launched=FALSE
- 300 UNTIL deadZ:livesZ=0: PRREsente
  - 318 \*FX15.0
  - 320 MODE 2
  - 325 VOU 23,1,0;8;8;8;8;
  - 330 PROChiscore
  - 348 IF AS="Y" THEN SOTO 7
- 350 END
- 340 DEF PROCECTEEN
- 365 FOR col=0 TO 3: VOU 19 .col. 8: 8: NEXT
- 380 MOVE 0.727: DRAW 50.48 B: DRAW50. JBB: DRAW100.200: DR AW600, 200: DRAW600, 300: DRAW 500.300: DRAW650.600: DRAW650 .408: DRAW 1279.400
- 398 MOVE 8, 8: GCOL8, 3: FOR Y=0 TO 726:PLOT 77.0.Y:NEXT 400 MOVE 646.0: FOR Y=0 TO
- 595: PLOT 77, 646, Y: NEXT 418 MOVE XS7, 926: GCOL3, 2:
- PRINT"+" 415 VOU 20,19,3,2;0;
  - 420 ENDPROC
- 438 DEF PROCinit
- 448 BADX=8: X5X=648: XBX=10 8: YP2=238: diffy=50: launched =FALSE: SHIP%=16
- 450 score%=0:dead%=FALSE: photon=FALSE:lives%=5
- 478 VDU 23,255,3,14,12,56 48,224,192,192,23,254,192, 112,48,28,12,7,3,3,28,18,27
- 480 VDU 23,253,0,0,0,0,0,0, 8,63,63,23,252,8,8,8,8,8,8,8, 252,252
- 498 VDU 23,251,129,255,24 ,68,68,68,66,129,23,258,24, 68, 68, 126, 126, 126, 65, 129
- 500 VDU 23,249,7,12,48,10 2,164,128,185,136,23,248,12 .178,194,78,25,9,193,98,23, 247,96,36,38,112,64,33,18,1 2,23,246,18,6,17,177,142,72
- 518 VDU 23,245,8,24,126,2 55.255.124.24.8
- 528 expls=CHR\$249+CHR\$24B

- +CHR\$8+CHR\$8+CHR\$10+CHR\$247
- +CHR\$246 538 ENDPROC

  - 540 DEF PROCShip 550 X5HIP=800
- 560 MOVE XSHIP, 856:6COL3.
- 2: PRINT CHR\$255: CHR\$254: MOV E XSHIP, 856: GCOL3, 1: PRINT C HR\$253: CHR\$252
  - 578 ENDPROC
  - 586 DEF PROChaddy
  - 598 XBAD=668+RND (554)
- 608 MOVE 18AD. 432: GCOL3.2 PRINT CHR\$251
- 618 TIME=0: time=RND(18808
- 628 ENDPROC
- 638 DEF PROCegveship 648 MOVE YSHIP. 856: GCGL 3.
- 2: PRINTCHA\$255; CHR\$254: NOVE XSHIP. B56: SCOL3.1: PRINT CH R\$2531 CHR\$252
- 658 XSHIP=XSHIP-SHIPI: IF XSHIP (300 OR ASHIP) 800 THEN SHIPY =- SHIPY
- 668 MOVE XSHIP.856: GCGL3. 2: PR1NTCHR#255: CHR#254: MOVE XSHIP.856: GCOL3.1: PRINT CH
- R#253: CHR\$252
- 678 ENDPROC
- 688 DEF PROCesvebaddy 698 MOVE XBAD. 432: GCDL3.2
- :PRINT CHR\$251 788 XBAD=XBAD+BAD7:1F XBA
- D>1214 OR YBAD(668 THEN BAD Y=-RADY
- 710 MOVE XBAD. 432:600L3.2 :PRINT CHR\$251
- 728 ENDPROC
- 730 DEF PROCesvesight
- 740 IF NOT INKEY (-104) A NO NOT INKEY (-183) THEN EN OPROC
- 750 HOVE XSX,926:GCCL3,21 PRINT\*+\*
- 768 IF INKEY (-184) THEN 151=151+32
- 778 IF INKEY (-183) THEN YS1=YS1-31
- 780 MOVE XSX, 926: GCOL3, 2: PRINT"+"
- 798 ENDPROC
- 800 DEF PROChase 810 MOVEXBX, 232: SCOL3, 2:P
- RENT CHR\$258 828 ENDPROD

  - 838 DEF PROCeovebase BAR IF NOT INKEY (-98) AN
- D NOT INKEY (-67) THEN ENDP

- ROC
- 850 MOVE XB1,232: GCOL3,2: PRINT CHR\$ 258
- 868 IF INKEY (-98) THEN X 8%=X8%-16: IF X8%(100 THEN X B%=100
- 870 IF INKEY (-67) THEN X 8%= X8X+16: IF X8%>535 THEN X BX=535
- BB0 MOVE XB1.232:GCOL3.2: PRINT CHR\$258
  - 898 ENDPROE
- 988 DEF PROCehoton
- 910 MOVE XP2, YP1: BCGL3, 1:
- DRAW XPZ+diffx, YPZ+diffy 920 IF POINTIXPX+diffx.YP
- X+diffy)=2 THEN PROCexol
- 930 IF POINT(XPI+diffx.YP I+diffy+51=t THEN diffy=-di ffv: YP1=880: SOUND 1,2,188.7
- 948 IF POINT (XPX+diffx. YP 1+d1ffv1=3 OR YPX)926 OR XP \$>1279 OR \$P\$(8 THEN SOUND
- 1.-15.200.5: photon=FALSE:di 44v=50: 1P1=1B1+32: YP1=23B: E REPRESE
- 958 XPX=XPZ+dif+x:YPZ=YPZ +diffy
- 968 MOVE XPX, YPX: GCOL3.1: DRAW XP2+diffx, YP2+diffy 978 ENDPROC
  - 980 DEF PROCexpl
- 998 IF YPX+diffy=838 THEN KI=XSHIP: Y1=888: MOVE XSHIP .856:GCOL3.2:PRINTCHR\$255+C HR\$254: MOVE XSHIP, 656: BCOL3
- .1: PRINTCHR\$253+CHR\$252:1iv es%=lives%-1: (F lives%=@ TH EN dead%=TRUE
- 1000 IF YPX+diffy=430 THEN XI=XBAD:YI=464: MOVE XBAD.4 32:8COL3, 2:PRINTCHR\$ 251: sco rel=scorel+150
- 1818 IF YPX+diffy=238 THEN X1=XBX:Y1=264:MOVE XBX.232 :GCOL3,2:PRINTCHR\$258:dead1 =TRUE
- 1828 HOVE X1.Y1:8COL3.2:PR INT expl\$:50UND0,-15,5,10:F OR delay=1 TO 500: NEXT: MOVE
- 11. YI: PRINT expl\$ 1838 IF YPX+diffy=B38 THE
- N PROCehio 1848 IF YPX+diffy=438 THEN PROChaddy
- 1858 IF YPX+diffy=238 THEN PROChase
- 1848 ENDPROC
- 1878 DEF PROCECURE

1080 01=100404 1898 VINIA: COLOUR 1: PRINTTA B(0,0) "50:", score%; TAB(0,2) "LIVES: ":lives2:VOU 5 LIGH ENDPROC

1110 DEF PROChoab

1128 IF Xbcab=489 AND Ybom b=700 THEN PROCShower: ENOPR

1138 MOVE Xbomb, Ybomb: GCOL 3.3: PRINTCHR#245

1140 Ybosb=Ybosb+32: IF Ybo ab > 700 THEN Ybosb=700

1150 IF Ybonb=700 THEN Xbo mb=Xbomb-64: IF Xbomb(400 TH EN Iboab=488

1160 MOVE Xbomb, Ybomb: GCOL 3.3:PRINTCHR\$245

1178 IF Xboab=488 AND Ybos 5=700 THEN SOUND 0,-15.6.5: MOVE Abomb. Ybomb: GCOL3.3: PR INTCHR\$245: FOR N=1 TO 12:X( N) = RND (488) + 188: Y(N) = 688+RN D(100): NEXT: GCOL3, 3: FOR N=1 TO 12: PLOT 69. X(N) . Y(N) : NE XT

1160 ENDPROC

1198 DEF PROCShower 1200 GC9L3.31FDR N=1 TO 12

:PLOT 69,X(N),Y(N);NEIT 1218 FOR N=1 TO 12; Y(N)=Y( N) -32: NEXT

1220 GCOL3, 3: FOR N=1 TO 12

:PLOT 69. I(N) , Y(N) : NEIT 1238 FOR N=1 TO 12

1248 IF POINT()(N),Y(N))=1 THEN I1=XBX: Y1=264: MOVE X8 1,232: GCOL3, 2: PRINTCHR\$250: PROCexpl:dead%=TRUE:TIME=8

1250 NEXT

1268 ENDPROC

1278 DEF PROChiscore 1280 I=0

1298 FOR S=1 TO 18

1388 If score%)score(S) IH EN Z=Z+1

1318 NEXT

1320 COLOURS: PRINT ""

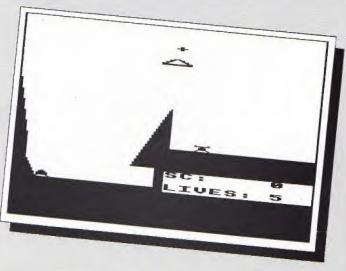
You scored 1325 COLOUR L: PRINT ""

":score! 1330 COLOUR 3: PRINT ....

you are" 1348 IF 2=0 THEN PRINT "\*

NOT 1350 COLOUR SIPRINI" o n the high score"

1368 PRINT TABLE



1378 FOR C=1 TO 2008: NEXT 1380 IF 2)0 THEN PROCtable

1398 FOR c=1 TO 5888: NEXT 1488 CES

1485 +FX15.8

1418 PRINT TAB(8,15) "Anoth er game? IY / Win

1428 REPEAT: As=INKEY\$(B):U MTIL A\$()""

1438 ENDPROC

1448 DEF PROCtable

1458 CLS 146B COLOUR 3

1465 +FX15.8 1478 PRINTTAB(0.4) "What is

your name?" 1488 INPUT TAB(4,15), name\$

1498 FOR C=1 TO I

1500 name\$ (C-1)=name\$ (C) :s core(C-1)=score(C)

1518 NEXT

1511 score(2)-score2:names (Z)=name\$

1515 CLS

1529 COLOUR 3: PRINT'" LL OF HONOUR"

1530 PRINT .... 1548 87=400505

1550 FOR C=10 TO 1 STEP -1 1568 COLOUR I

1578 PRINT'score(C); "..... ": names (C)

1575 GCOLB. 6: MOVE 8.8: DRAW

8,1823:DRAW 1279,1823:DRAW 1279.8: DRAW B. 8: MOVE B. 939

:DRAW 1279,939 1588 NEXT

1598 ENDPROC

1400 DEF PROCINSTRUCT 1618 PRINT' The aliens are patrolling a walled of

lateau. All airborne weapon s have proved useless against them. The only we apon which can destroy them "PHOTON BUN" whi is the ch is very heavy and is oro

und-based."

1628 PRINT'\* The FLEET C ONMANDER has come up with a brilliant idea. All aircra ft have beenfitted with ref lective material on the ba se. Your PHOTONS aust hit t his base to be reflected back onto the aliens."

1638 PRINT' If you hit the ship you will destroy i t and you only have FIVE le ft. The + sign at the top of the screen is your si oht and is the point throug h which the PHOTON will cass if not interrupted."

1640 PRINT" TAB(5) "PRESS SPACE BAR TO CONTINUE"

1650 REPEAT UNTIL GET=32 1668 CLS

1670 PRINT" "TA3(16) "CONTR DLS" TAB(16) "----"

1688 PRINT " T ------ Move base LEFT\*\*\*\* 1 ---------- Move base RIGHT\*\*'\* ( ----- Move sight ( +) LEFT" " " > ------ M ove sight (+) RIGHT " "SPAC E BAR ---- Fire PHOTON GUN" BDOD LUCK!

1890 PRINT TAB(5,23) "PRESS SPACE BAR TO CONTINUE.": RE PEAT UNTIL GET=32

1693 CLS:PRINT TAB(2,2)"A FEW MOMENTS DELAY, THEN BE READY .... "TAB(13.6) "By the way .... "TAB(2,18) "Watch ou t for the shower boabs!" 1708 FOR DELAY-1 TO 4000: N

EXT 1718 CLS: ENOPROC

1728 DEF PROCerror 1738 REPORT: PRINT" at Line "; ERL

1750 ENDPROC

This listing is included in this month's cassette tape offer. See order form on Page 51.



MACHINE code is the language which microprocessors such as the 6502 used by the Electron understand. It consists simply of binary numbers in the range 0 to 255.

As you can imagine, this is very difficult to follow and next to impossible to write. You get line after line of 0s and 1s.

So instead of using straight machine code we normally work with assembly language.

This is a great deal easier to manage, as mnemonics are used to represent each instruction. If you wanted to

R type=7 OR type=12 PROCori

nt (byte1%): PROCorint (byte2%

200 IF type=8 DR type=8 a

228 FOR 11=8 TO (EVAL("&"

258 PRINT TAB(18); mnemoni

+codes) AND AFF00) DIV 1100

238 READ anemonic#

268 PROCorint data

280 DEF PROCinitialise

298 VDU 19,1,6;8;19,8,4;8

388 PRINT'TAB(13) "DISASSE

1:address=address+3

218 RESTORE 1818

ddress=address+1

248 NEXT

278 ENDPROC

write a machine code program you would normally write it in assembly language and use an assembler to convert this into machine code.

An assembler is a program which will take a series of assembly language mnemonics and convert them into

350 ENDPROC

(127 VDU byteI

348 DEF PROCTORS

378 AX=18889:FX=8

388 REPEAT byte%=FNbyte(A

390 IF byte1>31 AND byte1

byte12=address?1:byte22=add

ress?2

machine code proper.

To read a machine code program then you do the reverse - convert it into assembly language using a disassembler.

A disassembler is the opposite of an assembler, taking an unintelligent mach-

518 PRINT " ": "address; ":

520 PROCorint (byte%)

10 REM Disassembler 28 REM By R.A. Waddilove 30 REM Version 3 40 REM (c) Electron User 58 MODE A 60 PROCinitialise 78 REPEAT 88 PROCincut 90 REPEAT 188 char\*="" 118 PRODfind code 120 IF found PROCdisassea hie FLSE PRINT TAB(18): "No. such code";:address=address 138 PRINT TAB(36); char\$: \* FX21.8 140 UNTIL INSTRIBITE, SETS

MBLER"" 'TAB (7) "ROM's": 318 FOR 1%=8 TO 15 328 IF 12722AR PRINT 17: " : "::ROM=IX:PROCroms 330 NEXT 348 PRINT ' TAB (10) " I=inou t new address" " Hold down any other key to disassembl 6.

488 AX=AX+1 418 IF byteX=0 FX=FX+1:PR FFFFF" INT" ": 420 UNTIL FX=2 438 ENDPROE 448 DEF PROCincut 450 INPUT' Start address ="taddress\$ 460 address=EVAL address\$ 478 IF address ) & 7FFF AND address(&C000 INPUT " ROM n umber ": ROM ELSE ROM=-1 488 ENDPROC 490 DEF PROCfind code 500 IF RDM>-1 byte%=FNbvt e(address):bytel%=FNbyte(ad **668 ENDPROC** dress+1):byte2%=FNbyte(addr 670 DEF PROCorint data ess+2) ELSE byte%=?address: ABO REM accumulator 698 IF type=8 PRINT "A";:

538 RESTORE 1028 548 REPEAT 550 READ code\$ 560 UNTIL (EVAL("&"+code\$ IAND &FF1=bytel OR code\$="F 578 IF codes="FFFFFF" fou nd=FALSE ELSE found=TRUE: tv pe=(EVAL("&"+code\$)AND &FF0 888014 VIO:888 580 ENDPROC 598 DEF ENbyte(BX) 600 !&F6=BZ: YX=RDM 618 =USR(&FFB9) AND &FF 620 DEF PROCorint (BX) 638 1F BX>31 AND BX(127 c har\$=char\$+CHR\$(BZ) 648 IF BX(16 PRINT "2"; 650 PRINT: "BX: " ":

ENDPROC

150 UNTIL FALSE

170 DEF PROCdisassemble

188 IF (type AND type(5)

OR (type)8 AND type(12) PRO

Corint (byte11) : address=addr

190 IF type=5 OR type=6 O

1AB END

e55+2

ine code program and converting it back into a list of assembly language mnemonice.

As you probably know, the Electron has a pretty powerful assembler built in to the Basic ROM. This can be used to write machine code programs in assembly language.

What's lacking is a disassembler for reading machine code programs. This isn't quite as essential as an assembler, but is still a useful tool.

The program presented here will fill that gap. It's a powerful disassembler which will convert 6502 machine code back into assembly language mnemonics.

A disassembler is useful for checking whether a machine code program has assembled correctly or if it's become corrupted for some reason.

Also it's interesting to explore the ROMs and follow the various routines within them. These can be selected and disassembled quite easily.

When run, the disassembler will print a list of all the ROMs present and their number.

If you opt to disassemble from an address between

DISASSEMBLER

ROM'S

# 1 REST | 80 | 80 |

11 : BRSTT | 10 | 10 |

12 : Eleatron Expansion | 1.00 |

Hold down any other key to disassemble |

Start address | 7.00 |

908: HD 80 | 80 | 80 |

908: HD 80 |

90

&8000 and & BFFF you will be prompted for a number. Just type in the number of the ROM you'd like to disassemble and the propgram will do the rest.

The disassembler has been designed to use up as little memory as possible so that a machine code program can sit in the memory at the same time and be disassembled.

The program is reasonably intelligent, so that when a common operating system call is encountered its name will be printed instead of just the address.

Whether you're a serious machine code programmer or just a dabbler, you'll find it such a useful tool you'll wonder how you ever managed without it.

The program needs 4k of memory which can be anywhere, so set PAGE to any value from &E00 (or &1000 for Plus 3 disc drivers) to &5000 before loading it. This will enable a machine code program to be \*LOADed to the memory left over and disassembled.

The start address for dis-

assembly can be entered in decimal or hex. The ROM number, however, must be in decimal.

A hard copy can be obtained by pressing Ctrl+B when you enter the address.

Be careful when entering de statements. When the program is running type in a few machine code programs and test the disassembler. There are several to choose from in the Electron User Guide.

The second set of data statements might seem a little strange. Each item is a three byte hexadecimal number, &AABBCC.

&CC is the first byte of the better code. Each byte is compared with this until a match is found. If there is a match then &BB is a pointer to the instruction and &AA is the type of addressing mode. PROCprint\_data shows the various modes.

FNbyte(8%) reads a byte of data from a paged ROM. The address is placed in &F6/8-F7 and the ROM number in the Y register. CALL &FFB9 reads the byte, and returns with it in the A redister.

700 ON type 60TO 720,740, 760,780,800,880,900,910,933 ,960,980,1000

718 REM immediate 728 PRINT "#&"; "bytel%;:E NDPROC

730 REM zero\_page 748 PRINT\*&"; "bytel%;:END

750 REM zero page x 760 PRINT'&";"bytel%:",%"

770 REM zero page v 700 PRINT"1": "bytel%:", Y"

::ENDPROC 790 REM absolute 800 BX=byte1X+256+byte2X:

RESTORE 1070 810 FOR JX=0 TO 11

820 READ OScall\*, OScallX 830 IF 8X=OScallX PRINT O Scall\$::8X=-1

848 NEXT

850 IF 8%>-1 PRINT"%":"8%;

860 ENDPROC

870 REM absolute\_x 880 PRINT"k": "byte12+256\* byte2%; ".X"; :ENDPROC

990 PRINT"%"; "byte1%+256+ byte2%; ", Y"; :ENDPROC

918 ENDPROC

928 REM relative

930 IF byte1%(128 PRINT"& ";"address+byte1%; ELSE PRI NT"&";"address-(256-byte1%); 940 ENDPROC

956 REM pre\_indexed\_indir

950 PRINT" | %"; "bytel%; ", X } "; : ENDPROC

970 REM post\_indexed\_indi rect

980 PRINT'(&";"byte1%;"1, Y";:ENDPROC

998 REM indirect [808 PRINT"(%"; bytel%+256 +byte2%; ")";: ENDPROC

1818 DATA ADC.AND.ASL.BCC. BCS.BEG.BIT.BHI, BHE, BFL.BRK. BVC.BVS.CLC.CLD.CLI.CLV.CM P.CPX.CPY.DEC.DEX.DEY.EDR.I NC.INX.INY.JMP.JSR.IDA.LDX. LDY.LSR.NOP.ORA.PHA.PHP.PLA .PLP.RDL.ROR.RTI.RTS.SBC.SE C.SED.SEI.STA.STX.STY.TAX.T AY.TSX.TXA.TXS.TYA

1028 DATA 80A00.A2201,2228 5,28208,82408,12209,204,522 50,50208,90910,82211,32215, 30216,30018,72219,40210,402 1E,51020,A0121,28624,20125, 22728,80620,10129,2720,5062 0,50120,5272E,90730,80131,3 0135,32736,80233

1038 DATA 70139,68130,6273 E,82948,41741,21745,22046,8 2348,11749,204A,5184C,51740 5204E,90850,81751,31755,32 856,88F58,71759,61750,6205E ,82A48,40061,20045,22666,82 568,18869,2864,C186C,50060, 5286E,98C78,80071

1848 DATA 38075,32876,82E7 8,70879,00870,6287E,82F81,2 1804,22F65,23806,81688,8358 A,53180,52F80,5380E,90379,8 2F91,33194,32F95,43896,8379 8,72F99,83694,62F90,11FA0,A 1DA1,11EA2,21FA4,21DA5,21EA 6,833AB,11DA9 1058 DATA 832AA,51FAC,51DA
D,51EAE,90480,81D81,31F84,3
1D85,41E86,81088,71D89,8348
A,61FBC,61D8D,71E8E,113C0,A
11C1,213C4,211C5,214C6,81AC
8,111C9,815CA,513CC,511CD,5
14CE,988DB,811D1,311D5,314D
6,90ED8,771D9

1060 DATA 61100,614DE,112E 8,A28E1,212E4,228E5,218E6.8 19E8,12BE9,821EA,518EC,528E 0,518EE,905F0,82BF1,32BF5,3 18F6,820F8,72BF9,62BF0,618F E,FFFFFF

1070 DATA osfind, EFFCE, osb put, EFFD4, osbget, EFFD7, osar gs, EFFDA, osfile, EFFD0, osrdc h, EFFE8, osasci, EFFE3, osnewl , EFFE7, oswcch, EFFEE, osword, EFFF1, osbyte, EFFF4, oscli, EF FF7

This listing is included in this month's cassette tape offer. See order form on Page 61.

10REM+\*\*\*\*\*\*\*\*\*\*\*\* 20REM JOREM Mathematical Curve 40REM SOREM By A.J. Reynolds. SOREM (C) ELECTRON USER 70REM+#+\*\*\*\*\*\*\*\*\*\*\*\* ++ BANDOE? 90REM cursor off

100VDU23.1.0:0:0:0:0: 110REM setup of variables 120radius=400 130anole=0 140REPEAT 150REM increment angle 180REM the shorter the st 170REM tighter the patter 180REM +0.01 is nice 190angle=angle+.1 200x=FNforex 210y=FNfgrmy

220PRDEdram(x,y)

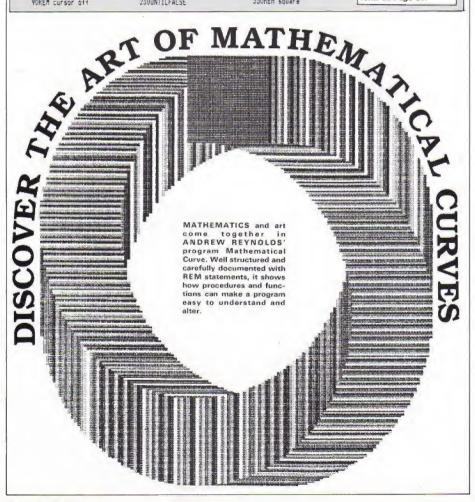
230UNTILFALSE

240END 250RFM\*\*\*\*\*\*\*\*\* 250DEFPROEdraw(x,y) 270REM change colour 280col %=col %+1 2901F col126 THEN col12=0 300REM sets graphics bac karpund 310REM then clears graphi cs screen 3206CDL0.col7+128

450=412+radius\*COS(anole) 330REM set graphics windo 340REM to produce a 200 b y 200 350REM square

360VDU24, x; y; x+200; y+200; 370CLS 380ENDPROC 390REM########## 400REM change formulae fo 410REM for different curv 420DEF FMfprex 430=540-radius\*SIN(angle) 440DEF FNformy

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exitin. SHEEPMIM The logic game.
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A cultured classel. CEDRIC
Educational fun. THREE-D
Outstanding utility. SPORES
Fascanising graphics. MOONORBIT
House, ELOWERS A BUS.
Bould, NOTEBOOK Annotated
astronglish.

On the April 1985 tape:
SUPER ARCHER Target (Walcher)
SUPER ARCHER Target (Walcher)
SUPER ARCHER Target (Walcher)
SUPER ARCHER Target (Walcher)
SUPER TARGET (WA

On the Manch 1985 tane:
MR. FREZE to each accordant of MR. FREZE to each accordant of the MR. FREZE to each accordant of the MR. FREZE to each accordant of the MR. FREZE TO EACH TO EACH TO WORD GAME Educational fun. BIO LETTERS Large Lest utility. PERCY 56st the burning, fuse: ANIMATION Two axample pogenirs. PIGS FVIII begon. NOTEBOOK Deplay Townsmill.

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On the December 1984 tupe: CHRISTMAS BOX Align the CHRISTMAS BOX Align the Sort mat the muddle. SNAP Match the Xmas pictures. RECOVERY The Bod Program message same. CAROL Interrupt driven music. AUTODATA A program that grows and grows. NOTEBOOK Slotale string handline.

On the November 1994 tape: STAR FIGHTER Antivalies missions. SCRQLER Wrop around machine code. URBAN SPRAWL Elsystemental action game. SPELE Alphabetic education. JUMPER Evel headed action. CASSAR Code breaking broken. KEYBOARD. Toming amount.

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MULTICHARACTER
GENERATOR Confides charactersmade simple. RIGEL 5 Out of this
would graphics. MAYDAY Help with
your cross code. NOTEBOOK
Polintromes and string handling.

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in the spirit workt SPLASH A logic
game for non-eximitors. SORT
SHOWS How soning algorithms
work. SORT TIME The time they
take. CLASSROOM INVADERS
Multiculower characters go toschool, SAILOR Nauthal annes.
MATHS TEST Try out your meilted

On the August 1984 tape: SANDASTLE The Electron seaside SANDASTLE The Electron seaside batter brick voils. PARACHUTE Keep the skydivers dry. LETTERS Large Intern for your scheme SUPER-SPELL Test your spoiling. SUPER-SPELL Test your spoiling. Comes in your Electron. SCROLLER Sliced strings slice sideways. FLYING PIGS Bacon, on the wing.

On the July 1984 tope:
GOLF A day on the links with your
learners OUTAIRE The classic
solo logic game, TALL LETTERS
Large characters made surgise,
BANK ACCOUNT Keep 1792k of
your money CHARTIST 3D graphs
FORMULAE Avers, volumes and
angles.

On the June 1986 tape: MONEY MAZE Avail in eighouts to get the cash. CODE BREAKER Amanagement is needed to care in the code. ALLEN See lattle green men experience way 18 ETUP Colour common so though the code. ALLEN See lattle green men experience without tests. Common seek the common s

On the May 1884 tape: RALLY ORIVER High speed of control. SPACE PODS More alien to annihilate. CODER Speed sides an annihilate. CODER Speed speed messages, made simple. FRUIT—MACHINE Spin the wheels to win. CHASER Avoid your opponent to solve ITC-TAC-TSE Electron. DRAUGHTSMAN Create and seve Electron messages.

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classic, FRIEZE Electron wallpaper.
PELICAN Cross roads salely.
CHESSTIMER Click your moves.
ASTEROID Space is a minefield.
LIMERICK Automatic Thymes.
ROMAN Numbers in the account
way, BUNNYBLITZ The Easies
program, DOGDUCK The classic
togic game.

On the Absent 1885 stage:
CHICKEN is demandered relevant lest your nerver COFFEE and A standarders would grave from Down Under, PARKY'S PERLI Prity's case in an investigation made and a standard program. COUNTER Menual spinionaries can no that PAPER, our Electron CHARACTER CONTRIBUTION CONTRIBUTION CONTRIBUTION CHARACTER CONTRIBUTION CONTRIBUTION

On the February 1388 tape: NUMBER BALANCE TEST YOUT powers of hierard arithmetic CALCULATOR Make your Electron a calculator. DOILLES Multi-coloured potterns galore. TOWERS OF HANDI The age old puzzle. LUNA LANDER TEST your skill as astronaus. POSYTHON INVADERS A vession of the old arcade desputzle.

On the introductory reper.

ANAGRAM Str. but the introbled letters. DOODLE Multice learned graphics. EUROMAP Test your geography. KALEIDOSCOPE Electron graphics run rior.

CAPITALS. New upper case latters. ROCKET, WHEEL, CANDLE Three fireworks programs. BOMSER Drog and the bomble before you crash. DUCK Simple stemming. METEORS.

Colfisions in space.



Use the order form on Page 61

HAVE you ever really understood how a car engine works? Never mind - sit back and let your Electron show you.

The program first draws and names the relevant pieces of machinery involved.

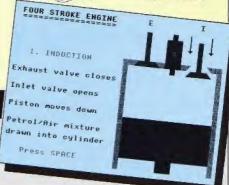
It then runs through the four cycles that make up a petrol driven internal comhusting engine.

Each step is clearly labelled. Once you can follow the sequence, things can be speeded up by holding the space bar down continuously.

The program makes extensive use of procedures with lots of meaningful names, and should be easily followed.

iat Regata 100s Twin cam engine

By DAVE ROBINSON



#### **Engine listing**

18 REM PETROL ENGINE 28 REM DAVE ROBINSON 38 REM (C) ELECTRON USER 40 : 50 MODE! 48 ON ERROR PROCEFFOR: EN D 70 VDU23,1,8:8:8:8:8: 88 PROCchars 90 PROCtitle 100 PRODdiagram 118 REPEAT 128 PROCengine 130 UNTIL FALSE 148 END 150 : 168 DEFPROCCHARS 178 VDH23, 224, 255, 255, 255 ,255,255,255,255,255 180 VDU23, 225, 255, 254, 252 ,248,248,224,192,128 198 VDU23, 226, 128, 192, 224 ,248,248,252,254,255 200 VDU23, 227, 255, 127, 63, 31,15,7,3,1 210 VDU23,228,1,3,7,15,31 ,63,127,255 228 VDU23,238,24,24,24,24 ,24,24,24,24 238 VDU23, 231, 24, 24, 24, 24 ,255,126,68,24 248 VDU23,232,24,68,126,2 55.24.24.24.24

10

268 B\$=A\$+A\$

8+CHR\$18+B\$

388 :

290 ENDPROC

320 COLOUR?

318 DEFPROCTITLE

270 d\_arrow\$=B\$+CHR\$231

258 A\$=CHR\$238+CHR\$8+CHR\$ 288 u arrows=EHR\$232+CHR\$

438 t 448 DEFPROCHERT (AZ.BZ)

458 COLOUR1

470 REPEAT UNTIL GET=32

488 ENDPROC

510 CLS: COLOUR3

528 PRINTTAB(1,3) FOUR ST

18. "=" |

560 PROCred

578 PROCplus

628 :

638 DEFPROCengine

338 PRINTTAB(6.3) "INTERNA L COMBUSTION ENGINE" 348 PRINTTAB(6,4)STRING\$(

26, \*= \*1

350 COLOUR3

368 PRINTTAB(2.8) "A diagr annatic explanation of the 378 PRINT' internal worki

ngs of a single cylinder" 388 PRINT 'TAB(2) "from a f

our stroke petrol engine." 398 PRINTTAB(2,17) "This i

s the type of engine fitted

488 PRINT'" to most motor vehicles in use today."

418 PROCnext (12, 26) 428 ENDPROC

460 PRINTTAB (AL. BL) "Press

SPACE"

498 :

500 DEFPROCdiagram

ROKE ENGINE"

53B PRINTTAB(1,4)STRING\$(

548 PROCcylinder 558 PROCpiston

580 PROCyalve("I")

598 PROCValve("E")

600 PROCnext (3, 28) **618 ENDPROC** 

648 PROCinduct

658 PROCnext (3, 27) 668 PROCcomp 678 PROCnext (3,27)

488 PROCionite 698 PROCnext (3.27)

700 PROCexhaust 718 PROCnext (3.27)

728 ENDPROC 738 :

740 DEFPROCcylinder 756 COLOUR2

768 PRINTTAB(2,7) "CYLINDE

778 COLOUR1

788 VDU7

798 FORIX=18 TO 28

800 PRINTTAB(21,1%)CHR\$22

818 PRINTTAB (39.1%) CHR\$22

828 NEXT

838 PRINTTAB(22,18)CHR\$22

848 PRINTTAB (23, 18) CHR\$22

858 PRINTTAB (27, 18) CHR\$22

868 PRINTTAB (28, 18) STRING \$ (5.CHR\$224) 878 PRINTTAB (33.18) CHR\$22

888 PRINTTAB(37.18) CHR\$22

898 PRINTTAB (38,18) CHR\$22

988 key=1NKEY(188)

918 ENDPROC

978 1

930 DEFPROCpiston

948 COLOUR2

950 PRINTTAB(2.10) PISTON

968 VDU7

978 VDU28, 22, 28, 38, 13

988 COLOURIST

998 CLS

1888 COLDURIZE 1818 VDU26

1828 key=INKEY(188)

1838 ENDPROC

1848 :

1858 DEFPROCENT 1868 COLOURZ

1978 PRINTTAB(2,13) CONNEC TING ROD"

1888 VDU7

1098 VDU28, 29, 28, 31, 21

1100 COLOUR131 1118 ELS

1120 COLOUR128

1138 VDU26 1148 kev=INKEY(188)

1158 ENDPROC

1168 : 1170 DEFPROCulus

1180 COLOURZ

1198 PRINTTAB(2,16) "SPARKI NG PLUG"

1288 VDU7

Turn to Page 48

# Classroom Computing on the Electron

To meet the ever-growing demand for educational programs on the Electron, one of the best-selling educational packages for the BBC Micro has now been adapted and enhanced for Electron users.

Classroom Computing on the Electron consists of 15 full-length programs, all specially chosen to combine educational validity with sheer good fun.

They range in scope from pre-reading to sixth form maths, and each has been thoroughly tested in the classroom.

The original BBC Micro version was warmly welcomed by teachers and parents, and reports that have come in from all over the country show how well they have proved themselves, both in the school and at home.

Now, in this new version, you can help turn your Electron into a valuable learning centre.

## 





### **MATHS TRIO**

Three invaluable elementary maths programs, which give the child guided practice and also graphically demonstrate the reasoning behind the sums.

**Tuadd:** Teaches how to add up two digit numbers, including carry and is illustrated with animated graphics. At various stages in the addition the child has to tell the Electron what to do next.

Tusub: Covers subtracting two digit numbers where the units 'won't go'. The Electron shows the subtraction in all its stages with graphics designed to illustrate the reasons behind each stage.

Tumult: Helps with elementary multiplication of two digit numbers – in particular where there are 10s to carry.

Calculator: Sums at a stroke! We turn your micro's screen into an easy-to-use calculator.

Table Mountain: Despite ever-changing fashions in maths teaching, tables still have to be learned. This program adds a lively new dimension to what is all too often tedious rote.

Gottit!: An intriguing two player word guessing game packed full of educational potential. Has three levels of difficulty.

House: Gentle, pictorial word, number and colour recognition for the very early reader or for those with learning difficulties.

Gallery: Based on a shooting gallery, this typing tutor will not only have parents, teachers and children touch-typing with ease—it's fun, too!

Whatnumber?: "I'm thinking of a number" is a well known classroom standby. We've taken it much further in this computer version, giving children far more flexibility in their strategy.

Bridge Breaker: Find the hidden word before it is too late. This is an exciting and novel way to reinforce vocabulary and spelling skills.

Snap: Practice vital pre-reading skills with this letter and number recognition game. Also helps develop coordination.

**Manipulation:** This is a compulsive and thoughtprovoking maths game. Given the four rules of number and three integers to work with, how close can you get to the target number?

**Vatrices:** Takes the calculations out of matrix manipulation, leaving the student free to understand the underlying concepts. (To obtain the fullest benefit from this program see The Micro User Education Special.)

Hidden Answers: Designed to help primary school children understand a maths learning technique called mapping maths. It explores the ideas of mapping with the use of simple number bonds.

Curvefit: Drawing lines of best fit between points, this program will find applications from the infants' class to the sixth form.

### **Engine listing**

From Page 45	valve opens"	2118 PRINTTAB(0,21) by exp	2548 PRINTTAB(XX-1,11)STRI
	1678 PROCopen("I")	anding gases"	NG\$ (3, CHR\$224)
1218 COLOUR3	1688 PRINTTAB(8,19) Piston	2126 PROCdown	255B PRINTTAB(XX-2,11)CHR\$
1228 VDU28, 29, 18, 31, 6	moves down*	2138 ENDPROC	228
1238 COLOUR131	1698 PROCdown	2140 :	2568 PRINTTAB(XX+2,11) CHR\$
1240 CLS	1700 COLDUR2	2150 DEFPROCexhaust	226
1258 VDU26	1718 PRINTTAB(8,22) "Petrol	2160 PROCclear	2578 key=INKEY(188)
1260 COLDUR128	/Air aixture*	2170 FOR IX=1 TO 3	2580 ENDPROC
1278 PRINTTAB (38,5) CHR\$224	1728 PRINTTAB(8,24)*drawn	2188 PRINTTAB(38,1%)SPC1	2598 :
1288 PRINTTAB (38, 11) CHR\$22	into cylinder"	2190 NEXT	2688 DEFPROCHOWN
4	1730 PROCin	2208 PRINTTAB(23,12)SPC15	2618 COLDUR3
1298 COLOUR1: COLOUR131	1748 ENDPROC	2210 COLOURI	2628 FOR 17=13 TO 19
1388 PRINTTAB (38,8) "S"	1758 :	2228 PRINTTAB(3,18)*4. EXH	2630 SOUND1,-15,1X+50,2
1318 COLOUR128	1768 DEFPROCCOMP	AUST*	2648 VDU28,22,1%,38,1%
1328 key=1MKEY(188)	1778 PROCelear	2230 COLQUR2	2650 COLOUR128: CLS
1330 ENDPROC	1788 FOR 1X=5 TO 7	2248 PRINTTAB(8,13) "Exhaus	2668 VDU28,22,12+7,38,12+7
1348 1	1798 PRINTTAB(33,11)SPC1	t valve opens"	2678 COLOUR131:CLS
1350 DEFPROCValve (A\$)	1800 PRINTTAB(37, IX)SPC1	2258 PROCopen ("E")	2688 key=INKEY(5)
1368 VDU7	1818 NEXT	2268 PRINTTAB(8,16) Piston	2698 NEXT
1378 COLDUR2	1828 COLOUR1	eoves up*	2788 key=INKEY(188)
1380 IF AS="I"THEN PRINTTA	1838 PRINTTAB(3,18)*2. CGM	2278 PROCup	2718 V0U26: COLOUR128
B(2,19) "INLET VALVE"ELSE PR	PRESSION*	2280 COLOUR2	2729 ENDPROC
INTTAB (2,22) "EXHAUST VALVE"	1840 COLOUR2	2298 PRINTTAB(8,19) Burnt	2738 :
1398 IF AS="1" THEN IZ=35		mixture out"	2740 DEFPROCUP
ELSE XI=25	1858 PRINTTAB(8,13) Inlet	2300 PRINTTAB(23,5)u_arrow	2750 COLOURS
	valve closes*	\$	2760 FOR 1%=19 TO 13 STEP-
1488 FOR 1%=6 TO 11	1868 PROCelose("I")		1
1418 PRINTTAB(12,11)CHR\$22	1870 PRINTTAB(8,16) Piston	2318 PRINTTAB(27,5)u_arrow	
4	soves up"	2328 ENDPROC	2778 SOUND1,-15, IZ+58,2
1420 NEXT	1888 PRINTTAB(8,18) aixtur		2780 VDU28,22,11,38,11
1438 PRINTTAB(XX-1,11)STRI	e compressed*	2330 :	2798 COLOUR131: CLS
NG\$(3,CHR\$224)	1898 PROCup	2340 DEFPROCalose (A\$)	2800 VDU28,22,IZ+7,28,IX+7
1448 PRINTTAB(XZ-2,11)CHR\$	1988 ENDPROC	2358 IF AS="1" THEN XX=35	2818 CDLOUR128: CLS
228	1918 :	ELSE 17=25	2828 VDU28, 32, 11+7, 38, 11+7
1458 PRINTTAB(XX+2,11)CHR#	1928 DEFPROCignite	2368 PRINTTAB(XX-2,1115PC5	2838 COLOUR128:CL5
226	1938 PROCelear	2370 PRINTTAB(XX,5)CHR\$224	2848 key=INKEY(5)
1468 PRINTTAB(X1,3)A*	1948 COLOUR1	2388 PRINTTAB(XX-1,18)STRI	2850 NEXT
1478 key=INKEY(188)	1950 PRINTTA8(3,10)"3. IBN	N6\$(3,CHR\$224)	2868 key=INKEY(188)
1488 ENDPROC	ITION.	2398 COLOUR129	2870 VDU26: COLOUR128
1498 :	1968 COLOURZ	2400 PRINTTAB(XX-2,10)CHR\$	2888 ENDPROC
1588 DEFPROCCIear	1978 PRINTYAB(8,13) "Electr	228	2898 :
1510 VDU28,0,30,20,6	icity to plug'	2418 PRINTTAB(XX+2,18)CHR\$	2900 DEFPROCIN
1528 CLS: VDU26	1980 PRINTTAB(30,1)d_arrow	226	2918 PRINTTAB(33,5)d_arrow
1538 ENDPROC	\$	2428 COLOUR128	- 1
1546 1	1998 key=INKEY(188)	2438 key=INKEY(188)	2928 PRINTTAB(37,5)d_arrow
1550 DEFPROCinduct	2000 PRINTTAB(0,16) *Mixtur	2448 ENDPROC	\$
1560 PROCclear	e ignited"	2450 :	2930 ENDPROC
1578 FOR 1125 TO 7	2010 GCDL0,1	2460 DEFPROCopen (A\$)	2948 :
1588 PRINTTAB(23,12)SPC1	2020 FOR 1X=752 TO 1254 ST	2478 IF AS="1" THEN XX=35	2950 DEFPROCError
1598 PRINTTAB (27, 12) SPC1	EP56	ELSE XX=25	2968 VDU22,6
1680 COLOURS	2838 MOVEIX, 588	2488 PRINTTAB(XX,5)SPC1	2978 IF ERR=17 THEN END
1618 NEXT	2048 DRAW972,632	2498 PRINTTAB(XX-2,18) SPC2	2988 REPORT: PRINT" at line
1628 PRINTYAB(3,18)*1. IND	2858 NEXT	; TAB(XX+1,10) SPC2	*: ERL
UCTION"	2868 FOR IX=4 TO 7	2500 COLOUR1	2998 ENDPROC
1638 COLOUR2	2078 SOUND8,-15, IX, 2	2518 PRINTTAB(11-2,18)CHR\$	
1648 PRINTTAB(0,13) Exhaus	2888 NEXT	225	This listing is included in
t valve closes"	2898 key=INKEY(188)	2528 PRINTTAB (XX+2, 18) CHR\$	this month's cassette
1658 PROC() gee("F")	2189 PRINTTAB(8.19)*Piston	227	tape offer. See order

2538 COLGURZ

tape offer. See order form on Page 61.

1658 PROCelose("E")

1668 PRINTTAB(0,16) "Inlet

forced down"

2189 PRINTTAB(8,19) Piston

# Micro Messages

I HAVE compiled a list of tips for Elite players who are just starting out.

As soon as you have 1000 credits, buy a front beam laser. You will get 400 credits refunded for the pulse laser.

Replenish your credits back to 1000 credits, then buy an extra cargo bay. This will extend your capacity from 20 tonnes to 35 tonnes, thus increasing the profit on each trin

Soon after those, both docking computers and an Energy unit are musts.

Never, once you have got your amount of credits above 400, let it fall down below 400 when buying extra equipment because (unless you bought your cargo first) you will not have enough money for a profitable amount of cargo.

Unless you know it is a meteor (asteroid) never shoot anything inside the Safety area. Otherwise the vipers get kill-happy and won't let you dock with a docking computer, or manually (I think).

As soon as you have a beam laser, instead of hyperspacing straight after you get out of the Coriolis, when you get out of the Coriolis, speed right up, switch to rear view, do a loop until the planet is full on your rear view.

Switch to market price or Data on system etc, then wait for the S to disappear, then

# The Elite way to become Deadly!

Front view and Jump until something appears on your scanner.

Blast it, make sure you're going away from the planet again and repeat.

This, within a short time, will push your rating up to Above Average.

If you ever get into trouble, for example, Shields Down, hyperspace to the next system, unless the planet is Anarchy or Feudal. In that case, alter it to a safer one. Or, if nothing is on your scanner, in that case slow right down and drift until shields are up again.

I hope that helps the potential combateers.

It should. I'm Deadly, soon to be Elite (hopefully!!) - David Kennedy, Teignmouth.

# How do I keep it secret?

I HAVE been computing for only a short time and would like to learn program security how I can stop people being able to break into my programs and see what I've written? - D.S. Leng, Cott-ingham, N. Humberside.

 Add the following line to your program:

and enter in direct mode,

2(PAGE+15)=21

This will poke character 21, which disables the VDU, into the first line.

Adding \*FX200.3 will disable the Escape and Break keys. Your programs should now be quite secure.

### A bug down in the Valley

I HAVE written to Electron User once before, giving some suggestions to improve the magazine (glad to see that Merlin has finally started a column).

It is Justin Leese's letter in the March issue of Electron User which has inspired me to write again.

He tells Katy King and the rest of us that we should SAVE

our initial position on Twin Kingdom Valley, and so, when we die, we could simply LOAD this position in the computer, reducing the time of waiting between games.

Is this a theory or has he tested it? On my copy of the game, and other people's, a saved position will not re-load.

I have not yet solved the adventure, but I now know how to and a saved position seems essential. HELPI - David Thompson, Sale, Cheshire.

 I have noticed recently in Micro Messages and my own mail that readers are having difficulty loading and saving their position in Twin Kingdom Valley.

On the review copy I received from Bug-Byte the commands used are \*SAVE and \*LOAD to save and restore your position.

These commands are documented in the cassette insert and worked perfectly at all times.

I have now finished the game and probably would not have done so had the commands not worked.

I suggest that if anyone has problems with these commands still not working they presumably have a faulty copy and should contact Bug-Byte on 051-709 7071 who will I'm sure be happy to organise a replacement. — Merlin.

### SLEEPLESS KNIGHTS!

FOR the third time my wife called down: "Are you coming to bed or are you sleeping down there again tonight?"

The time was 1.30am. The game was Acornsoft Chess. I had been waiting 45 minutes for my Electron to make the next obvious (Indeed the only) move to avoid checkmate.

In sheer desperation — and to prevent further domestic trauma—I pressed Escape, got the Main Manu, switched to Player vs. Player, switched back to the Chess Board and made the obvious move for the poor comatose computer. But

I did not get the message.

On resuming the vs. Computer game, with no word of thanks for my help, it went back into its slothful routine of a move about every 45 minutes. (Castling took about 50 minutes.)

I have tried everything to speed up a game of chess with Accomsoft Chess – playing at all levels, switching levels during a game, cursing, making stupid moves which a normal opponent would pounce on right away, cheating, typing in derogatory messages – all to no avail.

Acornsoft Chess still plods on its weary come-backtomorrow pace.

Perhaps one of your more experienced readers might devise a way of speeding up the computer chess moves.

Or, better still, perhaps Aconsoft will issue another Chess program more suited to ageing chaps like myself who have not all that much time left in which to play computer chess. — V.J. Horgan, Didgot, Oxon.

 On the higher levels it is rather slow, but is pretty quick on level 0 or 1.

# Ghouls have me fooled . . .

COULD you tell me how to get the treasure and to get on to the rest of the screens in Micro Power's Ghouls? I have tried and tried without success. — Paul Godley.

Can any of our readers

### No joy with the joystick

AFTER buying a Plus 1 for my Electron, along with a Volt-mace Delta 14b joystick, I was disgusted to find that the joystick did not work on two of my favourite games – Elite and Zalaga.

Both these games stated that it was possible to use a joystick.

I obviously thought it must be a fault in the Plus 1 of the joystick, but when I returned the equipment to the shop where I bought them, there were no faults to be found.

Does this mean that programmers are getting lazy?

Will there be more half-finished games in the future? -Robert Cope (age 13), Chelmsford, Essex.

 Both programs have bugs in which prevent joysticks being used.

You're right to be annoyed, as these bugs should have been spotted before the programs were released. However, even the experts make mistakes occasionally.

# Even numbers are odd . . .

I MAY sound sercestic, but I must complein about two letters (Electron User April issue).

First of all, J. Gooding, you can't have 59,528 on Guardian because 28 is not possible. 20, 25 or 30 is OK, but no even numbers are possible unless they go up in tens.

Also, D.M. Bell, of Manchester, the reason why Elite is so Inferior is because the Electron has less memory available than the BBC.

By the way here are my highest scores:

Guardian, 28,060.

Danger UXB, 147,010.

Felix In The Factory 7,440.

Tim Hier (age 13),

Pembrey, South Wales.

# Frustration is overcome

WHEN writing programs in the graphic modes, it can be frustrating to try making sense

# DON'T GIVE UP - IT WORKS!

I'VE finally worked out how to get the Galactic Hyperspace in Elite to work!

and the sale of th

Press F6 (local chart) and make sure the cursor is positioned at the planet you are presently at.

After that, press the buttons Caps Lk Func, Ctrl and H simultaneously and very quickly.

Keep pressing the buttons rapidly until the message "Galactic Hyperspace" appears. You may get times when you think it's not going to work and your fingers are killing you – but don't give up, it will work eventually.

If this ever happens, and it usually does, it helps to change the screen or view after a few rapid bursts of pressing the buttons.

That is - after pressing F6 (local chart) press the buttons very quickly about 20 times and if it still doesn't work press

F4 (right view) and press buttons again.

If still no response, change view once again and press buttons

Like I said before, don't give up – it will work.

One more thing, Don't worry if the message "Hyper-space range" comes up. It always does — so just keep on hitting those keys. — Colin Harris, Stoke Newington.

of your listing when the size of the character set makes it hard to read and edit.

Mode 6 provides the most legible writing, but changing back to this mode each time is time-consuming.

The following program overcomes this problem by inserting control codes into the first line of the program which will change to mode 6, with a blue background, and paged mode on, whenever the program is LISTed.

Also, to overcome the problem of losing the top line of the display, control code 10 is inserted before the program is listed, which moves the display down by one line.

Lastly, as a reminder that the line is still in memory, a short message is shown at the head of the listing.

To produce this effect, first type in the following program carefully, making sure that no spaces lie between the line number 0, and the REM statement, nor between the REM and the series of numbers that follow it.

If this is not done, it will result in a "Bad program" error when the program is RUN.

OREH12345678981F1RST LI
NE IN USE
18PX=PAGE+6
28FGR AX=1 TO 18
38FGAD byte
48[ EQUB byter]
58MEXT
68DATA22,6,19,8,4,8,8,6,14,18

Now RUN the program, and the screen will display an assembly listing. The program should now be ready, so test it by typing LIST, The effects of the program should now be apparent.

apparent.
Delete lines 10 to 60, and
SAVE line 0 for future use by

#### SAVE "line.0".

To insert this line into other programs, first make sure your own program does not already include a line O, as this will cause later confusion.

Now to combine the two programs, type:

PRINTTOP-2
\*LOAD "IXXI" SSS

Where XXXX is the file name of your program, and SSS is the result that you should have obtained from TOP-2. The two programs should now be combined, and typing LIST when in any mode should produce a clear and legible listing. — Stephen Harrop, Radyr, Cardiff.

# I thought I'd go mad . . .

MANY, many thanks for your help with Mr Freeze (March Electron User). I thought I'd go mad typing it in, but your comments helped me find and correct my mistakes.

I don't know which is better, the game (which is great), or the feeling of accomplishment when it actually ran! Again, thanks. — Cliff Holmes, Rotherham.

• It's nice to hear from someone we've helped. Believe us, we know all too well how frustrating it can be, typing in listings. We do our best to help everyone who writes, but we need two things. The first is a stamped addressed envelope, the second is patience!

# Title pages – my method

I HAVE always been envious of the title pages used by games on the Sinclair Spectrum.

I didn't want to let my friends get away with this so i friends get away with this similar to the Spectrum's method. It is used by the Island and Planets programs on the Introductory cassette.

It is fairly simple. All you do is save the screen memory direct to cassette.

As the length of the screen memory varies from mode to mode, it goes like this:

Mode 0,1,2 = \*SAVE 3000 8000

Mode 3 = \*SAVE 4000 8000

Mode 4,5 = \*SAVE 5800 8000

Mode 6 = \*SAVE 6000 8000

Firstly though you have to draw the picture you want to save and in the same mode with the picture on screen, type the relevant command above.

In Modes 0, 1 and 2 it takes a long time as the screen memory is 20k long. It may be better with a disc drive connected.—Robert Fothergill, Redditch, Worcs.

### Solved

IN regard to Polygons (Electron User April issue) I would be grateful if you could explain where is the VDU25 that actually draws the figures in the listing given on Page 56?-R.A. Smith, Camberley, Surrey.

· Line 780 is the machine code equivalent of VDU25.

### A Top Ten for games?

THANK you for a great magazine - but please can we have more!

For example, a software chart of the top-selling 10 or 20 games. A hall of fame where readers can send in their hest scores Readers' tins on how to do well at certain games (for example, Elite and Guardian). And more reviews on the hardware and software being produced for the Electron.

Can you tell me: Would it he possible to use Acorn's Plus 3 in conjunction with First Byte's iovstick interface? - Steven Haig (age 15), Stockport.

 Unfortunately both the Plus 3 and the First Byte interface use the same area of memory. causing problems if they are both used at the same time.

Either can be used separately, though.

The Plus 3 can be disabled with \*NOADFS allowing the interface to be used.

### Riddle of the Lost Bracket

SURELY there's a mistake in April's Game of the Month? In the listing line 1670 reads:

x=arrowdev(play,arrow

Surely there should be a bracket at the end as in:

x=arrowdev(play,arrow)

Dean Warner, Peterborough.

· Sadly, your are right. The listing was all right when it left the editorial office (all our listings are taken from working programs), However, somewhere between here and your magazine the bracket went walkabout.

So far we've had no reports of its progress but we're dreading its arrival in another program

Our apologies to our readers and Ian Brown, the author

WHAT would you like to see in future issues of Electron User?

What tips have you picked up that could help other readers?

Now's here is your opportunity to share your experiences.

Remember that these are the pages that you write yourselves. So

tear yourself away from vour Electron keyboard and drop us a line. And please, if you want a reply, enclose an SAE. The address is:

Micro Messages Electron User Europa House 68 Chester Road Hazel Grove Stockport SK7 5NY.

### Attack - in slow motion

I RECENTLY bought Cylon Attack by A&F Software for my Electron.

The program was written for the BBC Micro, but I found it worked fantastic with my Flertron

Because of this I bought Chuckie Egg and Painter by A&F for the BBC 32k.

When I loaded them into my Electron they worked - but are so slow that they are virtually unplayable.

As I bought them from a clearance sale on a "no return" basis I was disappointed by having spent my money on two very good but slow pieces of software.

Can you tell me of any routine which I could enter before loading these programs to make them faster?

The only routine I know and have tried is setting the auto repeat to the fastest rate and loading the programs, but this was unsuccessful.

It would be a good idea if readers suggested ways of speeding up slow BBC software and telling other readers which software works. Mansoor, Halesowen.

West Mildlands.

 The Electron can't be made to run as fast as the BBC. unfortunately.

The simple answer is to buy Electron software - this will run at the correct speed.

8v all means borrow 8BC

software from friends, but don't buy any without seeing it running. Then you know what it's like.

### A question of education

I BOUGHT an Electron 15 months ago hoping to help my sons' education as well as for its entertainment value.

While it has phylously heen of assistance in their computer studies. I have been unsuccessful in obtaining any software of an O or A-level

I have seen one mentioned in the December 1984 issue of Electron User - Micro English produced by L.C.L. but have heen unable to obtain their address

Is it, as a non-user, that I do not know what to look for, or is there very little good O and A-level software about? -

M.K. Pelling, St. Leonards-on-Sea, Sussex.

 Most educational software is written for the BBC Micro. but some has been converted for the Electron, though, L.C.L. is at 26 Avondale Avenue, Staines, Middlesex,

# Don't make my mistake!

I AM writing to wern other readers about the mistake that I made, I was writing the program for Mark Frost, who requested a rotating circle in the April edition of Electron User

My friend asked me why integer variables are faster and I demonstrated by allocating values to A% variable and a normal one.

I pressed Break and called

up each variable and showed him how it no longer had the normal variable in memory.

Then to my amazement I discovered the program was now unlistable. Is there any explanation for this?

Incidentally, if anyone wants to protect their programs \*FX200,1 makes it inescapable and \*FX200,3 makes it inescapable and when broke inlistable. So if you use these codes always SAVE before running.

I wasn't quite sure what Mark meant about a rotating circle so I have written a rotating disc. If you look closely the effect can be quite good. - Paul Golding, Winchmore Hill, London.

· We don't know why you couldn't list your program. We couldn't reproduce the fault.

18 REM \*\*ROTATING DISC\*\* 20 REM By Paul Solding I 985

30 REM When the program is run the building of each seperate frame takes a whi le,so you must wait 50 seco nds before you can see anyt

40 REM it will run faste r on the BBC Computer

58 MODE 2 60 VDU 23.1.8:9:0:0:

78 FOR XX=1 TO 11

88 VDU 19. XZ. 8: 8: 98 NEXT

100 CX=1: RX=500 118 FOR BR=1 TO 11

128 NOVE 448,1812 138 GCOL 8.C%

148 FOR A=8 TO 2€PI STEP 0.25

158 DRAW &484RX+SIN(A).51

2+500+COS(A)

160 NEXT 178 CX=CX+1:RX=RX-58

180 NEXT

198 FOR XX=1 TO 11

200 VDU 19, XX, 7; 0; 718 PROCuause

220 VDU 19, XX, 0; 0; 238 NEXT

248 FOR 17:11 TO 1 STEP - 1 250 VOU 19.XX.7:0:

260 PROCoause

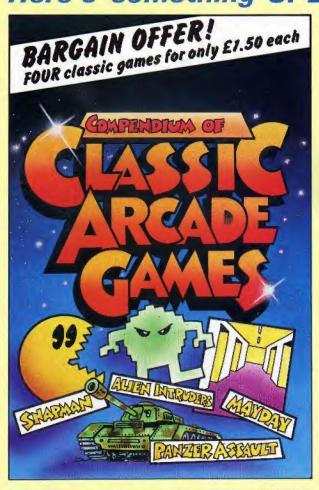
278 VDU 19.X%.0:0:

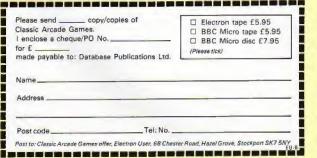
288 NEXT 298 GOTO 198

300 END 310 DEF PROCoause

328 FOR X=1 TO 58: NEXT 330 ENDPROC

## Here's something SPECIAL from







We've commissioned four rip-roaring games for the Electron and BBC Micro

Three of this highpowered collection
are top-rate machine-code
versions of arcade classics
and the fourth is a
thrilling real-time
adventure game.
There's hours of
enjoyment and something
to suit everyone in this
unique value for money
collection

SNAPMAN – Guide your man through the maze as he munches energy pellets and avoids hostile aliens

#### ALIEN INTRUDERS -

With only your laser for protection you must destroy the waves of aliens who threaten to engulf you

PANZER ATTACK – You are a tank commander engaged in vicious combat against encircling enemy forces

MAYDAY – A futuristic adventure! As captain of an interstellar cruiser you must guide the sole survivor of a stricken space freighter through the wreckage of his craft. If you fail to recover those vital medical supplies a whole planet is doomed!

## finitive Adventures for the Electron 'Having now tried all the Epic Adventures, they must be the yardstick

Wheel

ADVENTURES

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# **BOBBY CHARLTON SOCCER**

#### Available now for the BBC Model/B and Electron.

Play Bobby Charlton Soccer in your own hame. Build and manage a Chompionship side, see them match their skills and litness with opposing teams to create the kind of exciting games I played

teams to create the kind of exching games. I played in for Manchester United and England? "With the realism of this DACC Soccer Game your team win or lose by the way you instruct them to play. You will be shown a bird's eye view of your half of the pitch. Select and vary the skills of each of your players and then move them individually to whatever position in the field you know will create the best team formation.

me best ream formation.

him feath player is shown with three digits below him feathing to skill, occuracy and stamina in the range 1-5. To start off with each man has 3-3-3, giving him a total of 9. So the total for your team is 11xs, 99. This total of 97 cannot be exceeded, but the object is for you, the manager, to formulate your winning team using the best possible combinations of positions and skills.

Of course, as a professional footballer, injuries sustained by myself and team-mates often had a great influence on the outcome of the game. to create even more realism, you may add optional 'injuries' to the game, which are allocated randomly to each team by computer...hold your breath as your star forward swivels to shoot or goes

in for a hard tackle!"

Once your team is formulated, you are ready to mave an from the Management Module to

ready to move an institute management of the Module II—March Play.

With realistic 3D view of the pitch from the TV Camero position the game really comes to life. From the kick off every moment of the match unfolds realistically, with throw-ins, goal kicks, corner like pressing and shapting.

reassically, with Intow-ins, goal Kicks, Coner kicks, passing and shooting.

'The game can be played by 2 people, 1 per-son with computer or computer v computer. If the game is player controlled your joystick will control one man at once. Pressing the fire button enables

to change player...or, if the apposition are attacking your goal, to the goalkeeper

'If a player is in passession of the ball the fire "If a player is in passession of the ball the fire button initiates a pass or a shot. Control the accuracy and strength of the pass or shot by the extent of joystick movement and the height of the kick by the length of time that the fire button is depressed... from a Bobby Charlton connanball shot, to a carefully flighted Bryan Robson through-ballt Although bu have set the skill, accuracy and stamino levels of your players during the Manager Madule, the more a player is involved in the game, the mare energy the uses. ... his stamina levels and the runs more slowly! Then, when the player is not under joystick control, his stamina slowly builds up again."

If the game is under computer control, one

'If the game is under computer control, on or bath teams are played entirely by computer Under joystick control the player controls one ma at a time, whilst the computer provides intelliger action for the other 10.

The skill level you have chosen affects the success of tackles, the accuracy level and the direc-tion of the ball when kicked ...what could be more realistic than the Bobby Charlton Soccer Game from DACC?

The Cassette contains a voice introduction and play hints by Bobby Charlton and the Bobby Charlton Soccer Game package contains details on the Bobby Charlton Computer Soccer Club, with moil order products, services and special offers for

Package with Manager and Match Play Modules £11.95 inc. VAT (also including p&p for direct orders). Requires 2 analogue joysticks.

#### **Bobby Charlton Soccer Game from** DACC-the Simulation Specialists.

can to be available for Commodore 64 and Sinclair 48k Spectrum. Available through alcomputer specialists or direct from DACC

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EXTRA MODULES AVAILABLE SOON AODULES AVAILABLE SUUNI The World cup Module will be The World Cup Module will be Conon League Module will be Conon Ceagled by Rody of Individual Conon Ceagled by Rody of Individual players and leams



As it stands Activities is an educational program for use by younger school children. It could, however, be modified so that it could be an asset to older children as well.

It has been used by the teachers at my children's school in a slightly modified form on their disc based BBC Micros, and they tell me it is useful and well liked (although maybe they're just being polite).

The idea is to test a child's powers of observation and association.

The Electron selects a random activity from a list and draws some items on the screen which are associated with that activity. It also draws some irrelevant items.

The child's task is to decide which items are relevant and select them by pressing number keys 1-6.

If the selected item is relevant then it's ticked and the computer plays a chord, otherwise the drawing is crossed out and the computer makes a rude noise.

When the child thinks that he or she has all of the right items selected then they can press the F key, whereupon the computer will assess how well they have done.

Any drawings which should have been selected but were not are left on the screen, along with a comment. All irrelevant or correctly selected ones are rubbed out.

After 10 activities (none of which are the same), a score sheet is printed and another turn is invited.

The initial instruction page can be returned to at any time by pressing the Escape key and the sound effects can be turned on or off whenever the computer is expecting a key to be pressed.

Although this all sounds very daunting, in fact most children seem to be able to use the program easily and enjoy doing so.

My children run it on our Electron, but the program was originally written on a BBC, and because I am a lazy typist I'm afraid that the variable and procedure names are in upper case.

Also, because memory is at such a premium in the otherwise superb BBC/Electron computers, the variable and procedure names are rather cryptic.

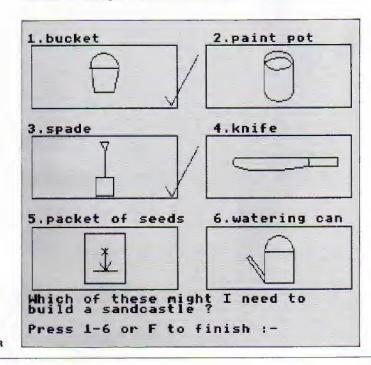
Because of the way the program works, it is essential that you do not renumber it, or at least the DATA statements at lines 10000 onward.

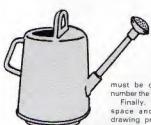
At this juncture it's worth outlining how the program works.

I have seen many programs of a similar nature which require access to a set of data in a random way — spelling games or Hangman spring to mind.

Most programmers seem to access the data in a random way by READing the data into a string array then generating a random number to be used as an array index.

Doing this means that there





are two copies of the data in the aforementioned limited Acom memory. (When is some bright spark going to bring out a main RAM expansion for the Electron, like there is for the

Because it is possible in BBC Basic to use the RESTORE statement using a variable or an expression rather than a line number, any DATA statement can be READ by setting the value of the variable to the line number of the DATA statement that you want.

It looks tricky, but in fact is very easy. This means that you must be careful how you number the DATA statements.

Finally, to save memory space and speed up the drawing process a bit, the resident integer variables have been used to some degree.

As I have already hinted, it is possible to add extra activities and drawings to the list or create a completely different one.

To create a new activity you must add a new DATA statement as follows (numbers are counted from DI:

100nn DATA activity

where an is the number of the activity and n1,n2 etc are the numbers of the associated items.

There can be from one to six items in the list. The asterisk at the end is to tell the computer there are no more items in the

Line 19999 with the hash sign must be present to show there are no more lists. Each individual drawing is defined as shown:

200nn@ DAYA item
name,M,x,y,D,x,y,E,x,y,r1,c
2,a1,a2...,#

where nn is the item number and x and y are the coordinates of a 500 x 200 grid on which the Item is drawn. The graphics Interpreter reads these codes as follows:

M,x,y: Moves the graphics cursor to x,y without drawing. D,x,y: Draws a line to x,y from the last graphics point.

E,x,y,r1,r2,a1,a2: Draws part of an ellipse with centre x,y, radii r1,r2 starting at angle a1 and finishing at angle a2.

The angles are measured in radians and increase anticlockwise with 3 o'clock being zero.

These codes may be in any order, but there is no error trapping, so they must be correct.

The asterisk at the end of

the statement is to indicate the end of the drawing. If the codes will not all fit into one DATA statement they may be continued into another one, although the line number for this must be less than 10 more than the initial one (for example, see lines 20100 and 20102).

The final DATA statement with the #indicates no more drawings are present, and it must be there.

If some clever dick of a little Johnnie points out that a so called irrelevant item goes with an activity, just add its number to the activity list.



#### **Activities listing**

10REM ACTIVITIES 20REM (C) Electron User 1985

30REM by Mike Plummer 400N ERROR GOTO 1428 50NDDE 6:PROCSETUP 60DIM ANX(5):QUX(5):LST\$

=STRINGS(40, "6"): ITEMs=LST\$ 70CLS: PRINT TAB(5, 10) "Wa it a minute, ! am thinking" : VDU 23, 1, 2; 0; 0; 0;

SURESTORE 10200:LCX=-1:R FPFAT | CX=|CX+1

POREPEAT READ LSTS:UNTIL LSTS="#" OR LSTS="\*":UNTIL

LST\$="#"

LBORESTORE 20000:ICX=-1:R

EPEAT ICX=1CX+1
118REPEAT READ ITEM\$:UNTI
L ITEM\$="#" OR ITEM\$="\*":UN
TIL ITEM\$="#"

12@REPEAT:RIZ=@:WRX=@:TTX =B:MODE4:VDU19,0,4;0;23,1,0 ;0;0;0;:FOR TEST=0 TO 9:CLS :PROCASK:PROCANS:NEXT:MODE6 :VDU19,0,4;0;23,1,0;0;0;0; PROCSC: UNTIL FALSE

140REK -- Get a set of it

1500EF PROCASK:LOCAL MIX, M2X:FOR MIX=0 TO 5:QUX(MIX) =-1:AMX(MIX)=-1:MEXT:HX=TRU

E
168REPEAT TX=TRUE:NIX=RND
(LCX):FOR ICX=8 TO 9:IF NIX
=STX(ICX) TX=FALSE

170NEXT:UNTIL TX 180STX(TEST)=N12

190RESTORE (9999+N11):REA LST\$:NANSX=0:REPEAT READ

D LST\*:NANS%=0:REPEAT READ ITEM\*:IF ITEM\*()\*\*\* THEN AN %(NANS%) =VAL(ITEM\*):NANS%=N ANS%\*!

288UNTIL ITEMS="+"

210FOR NIX=NAMSX TO 5:REP EAT:SAMEX=FALSE:BSTX=RND(IC X)-1:FOR N2X=0 TO 5:IF ANX( N2X)=BSTX THEN SAMEX=TRUE

22BNEXT: UNTIL NOT SAMEZ: A NZ(N1X) = QSTX: NEXT

230FOR NIX-0 TO 5: REPEAT

QSTX=RND(6)-1:UNTIL QUX(QST X)=-1:QUX(QSTX)=ANX(N1X):NE

240FOR NIX=B TO 5:PROCDRI TEM(NIX):NEXT:TTX=TTX+NANSX :NANSX=NANSX-1

250KP\$=""

260PRINT TAB(1,27); "Which of these might I need to"

" ";LST\$+" ?" 27@ENDPROC

27MENDPRUI 280:

290REM -- Draw an item (1

300DEF PROCDRITEM(NX):0ST X=QUX(NX):RESTORE (:0+0STX+ 20000):READ ITEM#:PRINT TAB (1+(NX MOD 2)+20,1+(NX DIV 2)+9):NX+1:"."+ITEM#

310UX=(NX MCD 2)+680+58:V X=755-(NX DIV 2)+298

328MOVE UZ,VX:PLOT 1,8,28 8:PLOT 1,580,8:PLOT 1,8,-28 8:PLOT 1,-500,8

330D\*="":REPEAT PROCINTPR T:UNTIL D\*="+" 340ENDPROC 350REM:

360REM -- Interpret graph ics code --

370DEF PROCINTPRT:READ D\$
:D\$=LEFT\$(D\$,1)
380F D\$="E" THEN PROCELL

:ENDPROC 3901F D\$()\*\*\* THEN READ X

X,YX ELSE ENDPROC 4001F D\$="H" THEN PTX=4 E LSE PTX=5

418PLOT PTI,UX+XI,VX+YI 42BENDPROC 430:

448REM -- Read answer fro a keys --

450DEF PROCANS 460AN\$="":REPEAT:REPEAT 470\*FX21,0

480PRINT TAB(1,30); Press 1-6 or F to finish :- "+C HR\$(8); AN\$=GET\$: IF AN\$="f"

#### From Page 55

THEN ANS="F" 4981F ANS="0" DR ANS="Q" THEN \*FX218,1 5001F ANS="5" OR ANS="5"

THEN MEX218.8 SIBUNTIL (ANS)="1" AND AK

\$(=\*6") DR AN\$="F"

5281F ANS="F" THEN PROCEN CH ELSE PROCNOCH: IF LENIKES )=6 ANS="F": PROCENCH

53BUNTIL ANS="F" (ENDPROC 548: 558REM -- Number answer h

andling -SABDEF PROCNOCH: ANSX=VAL (

ANS)-1: IF INSTR(KP\$, ANS)=8 KPS=KPS+ANS

57@IF DUX(ANSX) =- 2 THEN S DUND 1,-15,192,2: SOUND 1,-1 5.0.4: ENDPROC

588F1=FALSE: FOR NY=8 TO N ANSI: IF ANY(NX) = QUX(ANSX) T HEN FX=TRUE: ANX (NX) =- 2: QUX ( ANSY1 =- 2

598NEXT: IF FX THEN PROCHE ER: MOVE (ANSY MOD 2) +600+51 8.798-(ANSY DIV 21+298:PLUT 1,20,-30:PLGT 1,98,160:PRD

COEL: ENDPROC APPROCRASP: MOVE (ANSY NO D 21#600+50.755-(ANSI DIV 2 1\*298:PLOT 1.588.200:PLOT 8 .-500.0: PLOT 1.500.-200: QUX (ANSX) =-1: HX=FALSE: PROCDEL:

- 610: 620REM -- Small delay --ASODEF PROCDEL 648TIME=0: REPEAT UNTIL TI

ME=188 450ENDPROC

ENDPROC:

670REM -- Blow raspberry

**480DEF PROCRASP** 698FOR PX=4 TO 7: SOUND 8. -15,P%,5:NEXT

7001F QUY(ANSY)(>-1 THEN WRY=WRI+1 7180U% (ANSX) =-2

72BENDPROC 730:

74BREM -- Fanfare --7500FF PROCHEER 768RIX=RIX+1

778FOR PX=5 TO 28 STEP 15 780SOUND 1,-15,53,1

79050UND 1,-15,69,1 808SCUND 1,-15,81,P% 818T1HE=8: REPEAT UNTIL TI

MF = 25 820NEXT: ENGPROC

B3#: 840REM -- End of answers

handling -BEDDEF PROCENCH

BARFX=FALSE: FOR NX=0 TO 5 8786%=TRUE: FOR PX=8 TO NA NSX: 1F (QUI (NI) = ANI (PI)) AN D DUT(NT) >-1 THEN SX=FALSE: FX=TRUE

BEBNEXT PI: IF GI OR QUI (N ZICE THEN LET XX= (NX MOD 2) +28: YX= (NX DIV 2) \*9: FOR 2X= YI TO YI+8: PRINT TAB(XX, 1X) :SPC (20) : NEXT 74

ROBNETT NT PEOPRINT TAB(1,27)STRINGS

918PRINT TAB(8.28):: 1F F% THEN PRINT " What abou t this ?" ELSE IF NOT HY TH EN PRINT "You had some wron q quesses!" ELSE PRINT "

VERY WELL DONE !"

920PRINT TAB(8,38) STRINGS (38," ") TAB(15,38) "Press SP ACE": REPEAT UNTIL GETS=" ": ENDPROC

938: 940REM -- Draw an ellipse

950DEF PROCELL: READ XX.YX .R1.R2.A1.A2: INC=40/(R1+R2) :PLOT 4.R1+COS(A1)+UX+XX.R2 +SIN(AI)+VX+YX

968FOR A=A1 TO A2 STEP IN C:PLOT 5.R1\*COS(A)+U1+11,R2 \*S!N(A)+VX+YX:NEXT:ENOPROC 978:

99@REM -- Display scores

990DEF PROCSCICLS: PRINT T AB(5.2): "Your final scores are :-"

1800PRINT" Total number o f items wanted ":TT% 1010PRINT" Total number o f correct answers "¡RIX 1020PRINT" Total number o

f wrong answers ":WRI 1030PRINT' Press SPACE fo r some one else to try\*

1848+FX71.8

1858REPEAT: KEY\$=GET\$: IF KE Y\$="g" OR KEY\$="B" THEN \*FX 218.1 10501F KEY\$="5" OR KEY\$="S

" THEN \*FX218.8 1079UNTIL KEYS=" ": ENDPROC

1090REM Print Instructions

1188DEF PROCSETUP 1110DIM STZ(9) 1128\*FX18.8

1130\*FX11.8 1148CLS

1150VDU 19.0,4;0;23,1,0;0; B. R.

1160PRINT: PRINT TAB(15) "AC

TIVITIES" 1170PRINT '" The computer will decide that it wants" 1188PRINT "to do sceething and will draw six items"

1190PRINT "on the screen, alono with their name &" 1200FRINT "a number, Some

of the items drawn will" 1218PR!NT "be needed to do whatever the computer' 1220PRINT "wants to do. Yo u must tell it what it" 1230PRINT \*needs by pressi

ng keys 1-6. If the item" 1248PRINT "is needed then a tick will be drawn by' 1250PRINT "the picture, ot

herwise it will be' 1260PRINT "crossed out, Yo u will have 18 tries"

1278PRINT "then the comput er will tell you your\* 1280PRINT "score and ask f or someone else to try."

1298PRINT " Set the sound effects on by pressing"'t he 'S' key and turn them of f with the"'" "Q' key. This can be done now or at any"'

"time the computer is waiti ng for a key" "to be presse d. Select now (S/Q) \*

1300REPEAT: \*FX21,0 1310key\$=CHR\$(GET AND &SF) 1328UNTIL key\$="S" OR key\$

="0"

13381F key\$="5" THEN #FX 2 10.2 13481F keys="0" THEN #FX 2

1358PRINT "Press SPACE to start, ESC for this page";

1368\*FX21.0 1370REPEAT UNTIL SETS=" ": CLS -

1380FOR ICX=0 TO 9:STX(ICX }=-t:NEXT

1390ENDPROC 1489:

1410REM -- Error trapping

14200N ERROR DEF: IF ERR#17 THEN RUN ELSE MODEL: REPORT \*PRINT " at line "; ERL: \*FXt

1438END

1448:

10000 DATA plant some seeds .8.1.2.4 18981 DATA paint the house,

3.4.5.+ 18882 DATA have my dinner, 6

.7.8.16.\* 18023 DATA build a sandcast

le,8,9,+ 10084 DATA go for a drive, 1

8.11.4

18085 DATA go for a sail,12 .13,14,€

19084 BATA have a drink of tea.15.16.17.# 18887 DATA fly in the sky.1

8.19.28. 10008 DATA play cricket, 21,

22.23.# 12009 DATA tell the time, 24

,25,26,+ 18018 DATA write a story, 27

.28.29.\* 18811 DATA wash the windows

,9,4,30,+ 18012 DATA do some woodwork

,28,31,32,33,36,+ 18813 DATA do some cooking,

6.8.34.35.+ 18814 DATA mend the car, 18,

36, 37, 32, 38, + 10015 DATA clean my teeth,3

9.48.41.# 18816 DATA wash my face, 42,

43,44,45,+ 10017 DATA walk in the rain

46.47.48.+ 10018 DATA do my shopping,4

9,58,51,\* 10019 DATA play a tune, 52,5

3.54.4 19020 DATA go for a swim, 13 ,43,55,+

18821 DATA play football, 21 .56.57.4

18022 DATA have a party,58, 59.60.+

18023 DATA send a letter,28° ,29,61,62,63,\*

10024 DATA make a phone cal

1,01,01,\* 18025 DATA do the washing u 9,66,67,68,69,\*

9,00,07,00,07,\* 18826 DATA go to bed,78,71,

19999 DATA #

20010 DAYA packet of speds, M.188,28,0.328,28,0,328,188 .0,180,180,0,180,20,4,218,6 8,0,28,6,4,250,60,0,250,1 8,0,4,264,130,0,240,118,4,24 8,136,0,260,118,4,270,70,0,0,250,68,0,230,95,\*

20028 DATA watering can.M.2 80,20,0,300,20,0,300,120,0, 200,120,0,200,20,0,140,100, 0,146,106,0,200,42,6,250,12 0,50,50,0,334,\*

2033 D74 paint brush, M, 24 8,188, D, 240, 190, D, 268, 190, D , 268, 180, D, 288, 88, D, 228, 88, D, 248, 180, M, 228, 73, D, 228, 63, D, 210, 13, D, 290, 13, D, 290, 63, D, 220, 63, D, 228, 73, M, 288, 73, D, 280, 63, B

20048 DATA ladder, M.150, IB, D.248, 198, M.348, 198, M.348, 198, D.258, IB, M.78, D.160, 38, M.178, 58, D.778, 58, D.778, D.160, TS, D.778, D.160, TS, D.778, D.77

20832 OATA peint pot.E.238, 150,50,30,0,6.28,E.250,130, 50,30..15,3,E.250,50,50,30, 3.14,6.20,0,300,150,M.200,1 50,0,200.50.\*

20060 DATA FORK.M.98.78.D.1 80,78.D.208.99.D.402.99.D.4 80,110.D.208.310.D.180.130. D.150.130.D.150.70.M.130.90 .D.80.79.M.80.110.D.150.110 .M.150.130.D.90.130.2

20078 DATA plate,E,258,188, 120,58,8,6,3,E,258,180,188, 30.8,6,3,\*

30,8,6.3,\*
20000 DATA knife,M,350,100,
0,450,100,D,450,130,D,100,1
30,D,90,120,D,90,110,D,100,1
100,D,150,90,D,250,90,D,350

,180,D,350,130,+

M,328,58,0,188,58 20182 DATA H,300,68,0,218,6 8,0,218,188,0,378,188,0,358 ,148,0,388,148,0,388,68,4,3 80,148,0,225,148,0,218,188

20110 DATA steering wheel,E, 250,100,75,75,0,4,45,0,250,100,0,200,50,M,250,100,0,2

20128 DATA boat, M, 150, 75, D, 175, 50, D, 350, 50, B, 400, 60, D, 400, 75, D, 150, 75, D, 250, 170, D, 400, 85, D, 400, 85, D, 400, 85, D, 400, 85, D, 155, 85, C, 250, 170, M, 400, 85, D, 155, 85, C, 250, 170, M, 400, 85, D, 155, 85, C, 250, 170, M, 400, 85, D, 155, 85, C, 250, 170, M, 400, 85, D, 155, 85, C, 250, 170, M, 400, 85, D, 155, 85, C, 250, 170, M, 400, 85, D, 155, 85, C, 250, 170, M, 400, 85, D, 155, 85, C, 250, 170, M, 400, 85, D, 155, 85, C, 250, M, 400, M, 400, 85, D, 155, 85, C, 250, M, 400, M, 4

20130 DATA lifebelt.E.250.1 20.50.50.0.4.5.E.250.100.75 .75.0.6.5.M.325.90.0.300.90 .M.200.90.0.175.90.M.175.11 0.0.200.110.M.300.110.0.325 .110.0

28148 DATA compass,E,258,18 8,78,78,8,6.5,M,258,148,0,2 48,188,D,258,68,D,268,188,D ,258,148,M,248,145,D,248,18 5,D,268,145,D,268,165,\*

20150 DATA teapot.5.258,160 .10.10.0.6.4.6.256,100,50.5 0.5.5.10.3.M.275.55.D.225.5 5.0.150.135.D.160.135.D.200 .100.M.295.75.D.330.75.D.33 0.120.D.295.120.M.200.135.D .220.135.\*

20160 DATA aug.E.250.150.50 ,30.8.6.20.E.250.130.50,30, ,15.3.E.250.50.50,30.3.14,6 ,23.D.300.150.H.200.150.D.2 20.50.H.300.155.D.333.125.D ,333.75.D.300.75.\*

28178 DATA kettle, E, 250, 180, 58, 58, 63, 25, E, 258, 116, 18, 18, 64, 4, N, 175, 25, D, 175, 75, D, 280, 180, D, 380, 180, D, 325, 75, D, 325, 25, D, 115, 180, D, 130, 188, D, 175, 55, \$22188 DATA aeroplane, M, 150, 68, D, 258, 68, D, 268, D,

08, D, 200, 58, D, 300, 60, D, 400, 100, D, 150, 100, D, 150, 60, H, 13 5, 60, D, 135, 220, H, 13 5, 60, D, 135, 220, H, 135, 90, D, 1 50, 70, H, 400, 100, H, 130, L0 6, D, 200, L2 5, D, 200, L2 5, D, 200, L2 5, D, 200

.108.\*
20170 DATA airship,E,250,10
0,150,350,06.4,D,350,100,0
0,150,350,350,170,D,400,170
,D,400,350,D350,350,45
,M,300,55,D,205,220,22
,D,200,55,M,220,42,D,265,42
,D,265,30,D,220,32

16 20200 DATA balloon,E,250,14 8.50,50,50,6.4.4,M,308,140,0,2 80,140,0,230,50,0,270,50,0,308,140,M,250,140,0,250,52,40,230,550,0,230,15,0,270,15,0,270,50,5

20210 DATA ball.E.250,100,5 0.50,0,6.5.\*

20220 DATA cricket bat, M, 23 0,10,0,270,10,0,270,140,0,2 55,150,0,255,190,0,245,190, 0,245,150,0,230,140,0,230,1 2,45,150,0,230,140,0,230,1 2,45,150,0,230,140,0,230,1

20230 DATA wicket, M., 220, 10, D., 220, 170, D., 280, 190, D., 280, 1 0, M., 250, 10, 0, 250, 190, 4 20240 DATA sundial, E., 250, 75 , 180, 25, 0, 6, 4, M., 300, 75, D., 25

125,75,35,0.5,2.5,6,200,25,75,35,0.6,2.5,6,300,25,75,2
5,8.6,2.5,4,250,150,0,250,5
8,4,150,50,0,150,150,4,350,150,0,350,8,4,350,45,0,360

,175, D, 250, 150, H, 325, 100, D,

,147,# 20288 DATA pencil,M,150,88, D,400,50,0,400,120,0,150,12 8,0,75,100,0,150,80,D,158,1 20,N,100,94,D,100,106,N,150 ,100,0,400,100,\*

1,100,0,400,100,\*
20290 DAYA rubber,N.100,100
10,125,75,0,275,75,0,300,12
5,0,275,150,0,125,150,0,150
1,125,0,300,125,4,100,100,10
125,150,M.150,125,0,125,75,

28388 DATA washleather,M,2 88,58,0,388,58,0,388,158,0, 280,158,0,288,58,\*

200,10 DATA saw, M. 100,100,00 100,50,0,300,50,0,500,100,0 100,300,00,100,115,0,300,100,0 100,325,135,0,365,135,0,365 175,0,325,75,0,300,100,0,30 0,115,M,310,115,0,330,85,0, 350,90,0,350,125,0,325,125, 9,310,115,0

28328 DAYA hammer, M,200,85, B,208,135,D,215,159,D,208,1 58,D,178,115,D,178,58,D,208, .50,D,200,90,D,400,98,D,400,118,D,200,110,4

28338 DATA nails,M,158,58,D,228,138,D,228,138,D,228,138,D,228,138,D,248,158,D,248,158,D,248,158,D,248,158,D,275,188,D,275,188,D,275,188,D,275,484,D,388,58,D,274,48,D,388,58,D,274,48,D,388,58,D,274,48,D

28348 DATA mixing bowl,E,25 8,158,108,108,3,14,4.2,M,28 8,78,8,308,78,M,158,158,D,3 58,158,E,258,158,188,188,5, 3,6,38,4

28359 DATA cooker, M, 208, 18, D, 388, 18, D, 388, 178, D, 288, 18, B, D, 208, 18, M, 218, 25, D, 299, 2 5, D, 279, 80, D, 218, 28, D, 218, 2 5, M, 279, 78, D, 208, 79, M, 208, 1 88, D, 388, 188, M, 308, 129, D, 28 6, 128, M, 208, 178, D, 388, 178, M, 218, 118, D, 215, 118, M, 247, 11 8, D, 255, 118

20352 DATA N. 290, LLO, D. 295, 110, +

28368 DATA screwdriver, N, 15 8,98,0,300,78,0,300,125,0,4 88,125,0,400,75,0,300,75,0, 380,110,0,150,110,0,125,115 0,100,110,0,100,70,0,125,8 5,0,150,70,\*

20370 0ATA 611 can. M. 45, 150 , D. 200, 50, D. 200, 150, D. 300, 1

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58.0,388,65.0,358.65.0,358.135.0,388.135.0,388.135.0,388.135.0,388.58.0,288.65.0,55.158.0,45.158.0,288.178.0,288.178.0,288.178.0,288.178.0,288.178.0,358.158.168.+

28390 DATA toothpaste, M, 125, 75, D, 58, 75, D, 58, 125, D, 125, D, 125, D, 125, D, 158, 150, D, 458, 150, D, 458, 150, D, 140, D, 140, 150, D, 140, D, 1

28488 DATA toothaug,E,250,158,58,28,8,6,33,E,250,125,4
8,16,9,6,33,E,250,58,25,18,
8,6,33,H,225,58,0,280,158,M
,275,58,0,380,158,\*

20410 DATA toothbrush, M, 100 ,75,D,200,75,D,250,100,9,8 ,100,D,450,110,D,250,110,D,250,110,D,250,110,D,250,110,D,250,110,D,250,110,D,250,110,D,250,D,107,D,

28428 DATA face flannel, H, 2 88, 50, D, 388, 50, D, 380, 150, D, 288, 158, D, 288, 50, 4

20430 DATA towel, M, 125, 50, D, 375, 50, D, 375, 150, D, 125, 150, D, 125, 50, \*

28448 DATA wash basin, K, 158, 188, 0, 358, 188, D, 358, 125, D, 158, 125, D, 158, 128, D, 175, 125, D, 175, 158, D, 198, 158, D, 198, 158, D, 198, 158, D, 325, 125, D, 325, 158, D, 378, 158, D, 338, 158, D, 338, 158, H, 288, 158, D, 175, 158

20442 DATA E,200,100,50,59, 3.14,4.91,E,300,100,50,59,4 .91,6.4,H,200,41,D,225,41,D ,225,0,H,300,41,D,275,41,D, 275,0,\*

20450 DATA soap,E,250,100,1 50,50,1,1,2,2,E,250,100,150 ,50,4.2,5.3,M,175,60,D,175, 140,H,325,60,D,325,140,E,25 0,100,30,10,0,6.4,\*

20460 DATA unbrella, H,150,1 50,0,350,150,E,250,50,141,1 41,.70,2.4,H,250,150,D,250, 50,E,225,50,25,25,3.14,6.4,

28488 DATA raincoat, M. 288, 2 8, D. 388, 29, D. 388, 125, D. 349, 78, D. 368, 75, D. 388, 178, D. 275, 175, D. 225, 175, D. 288, 178, D. 148, 75, D. 168, 78, D. 288, 125, D. 280, 26, M. 259, 28, D. 259, 125, D. 225, 175, D. 218, 175, D. 258, 1 28, D. 25, 175, D. 275, 175, D. 25 8, 125, \*

28498 DATA money, M, 158,58,D, 158,188,D, 258,188,D, 258,188,D, 258,58,D, 158,58,E, 588,188,25,25,8,6,44,E, 275,158,28,28,8,3

20520 DATA ausic book, H, 250, 58, D, 258, 158, D, 150, 150, 150, D, 150, 150, D, 150, D, 258, D, 158, D, 150, D, 150, D, 258, D, 158, D, 158,

,D,480,175,\* 20540 DATA recorder,E,480,7

8,30,30,1.57,3.14,0,400,78, D.58,88,D,28,78,D,28,138,D, 58,128,0,488,138,0,488,138, 0,488,118,M,458,138,D,458,1 15,D,430,115,D,430,130,\* 28558 DATA swimming costume ,N,150,25,0,180,50,0,100,75 ,D,200,75,D,200,50,D,150,25 ,M,350,15,D,400,48,D,380,75 ,0,400,150,0,375,170,0,350, 130,0,325,170,0,300,150,0,3 28,75,0,300,48,0,350,15,\* 20560 DATA football boots.M ,158,50,D,200,50,D,200,70,D ,250,70,0,250,20,0,220,20,0 ,228,25,0,188,28,D,128,28,E ,150,20,30,30,1.55,3,14,M.2 20,70,D,220,90,D,278,98,D,2 70,48,D,258,48,H,200,78,D,1 70,70, 8,170,40,30,30,1.55,3

28570 DATA football shorts, M,175,50,0,235,50,0,258,70, D,260,50,0,325,50,0,325,125 ,D,175,125,0,175,50.0

20580 DATA glass of squash, E,256,158,59,20,80,633,E,256,50 4,125,49,16,0,633,E,256,50 4,25,10,86,33,47,225,58,0,20 8,150,41,275,58,0,380,150,44, 225,50,0,275,125,0,325,168

28618 DATA "paper, envelope", M.188,48,D,288,49,D,288,17
5.D,188,175,D,188,48,M,258,128,D,258,D,348,128,D,258,128,E
8,75,D,488,58,M,488,128,D,358,128,E
28628 DATA stamp,M,288,58,D,358,58,D,358,M,285,D,258,128,E
1,0,288,58,M,285,58,D,258,128,E
1,0,288,58,M,285,58,D,258,188,D,285,58,D,258,M,225,58,58,188,D,285,D,285,D,285,D,285,D,285,D,285,D,285,D,285,D,285,D,285,D,285,D,285,

,0,225,75,+

20638 0ATA postbox.H.200.18 .D.300.18.D.300.150.D.200.1 50.D.200.18.H.225.120.D.275 .120.D.275.135.D.225.135.D. 225.120.E.250.100.70.70.B.S .2.4.\*

28648 DATA phone directory, E.280, 125, 75, 75, 8.5, 2.5, E.38, 125, 75, 35, 8.5, 2.5, E.380, 25, 75, 35, 8.6, 2.5, E.380, 25, 75, 35, 8.6, 2.5, E.380, 25, 75, 25, 8.6, 2.5, E.380, D.25, 8.58, M, 158, 50, D, 158, 158, M, 388, 147, 8.

20660 DATA dishcloth,M,288, 50,D,300,50,D,300,150,D,200 ,150,D,200,50,\*

20670 DATA washing up bowl, M,150,100,0,175,50,0,325,50 ,D,350,100,0,150,100,4 20680 DATA tea towel,M,125.

20680 DATA tes towel, H, 125. 58, D. 375, 58, D, 375, 158, D, 125 , 150, D, 125, 50, +

28690 DATA washing up liqui d.M.200,18.D.380,10.D.380,1 60.D.275,175,D.275,190,D.22 5,190,D.225,175,D.200,150,D ,200,10.+

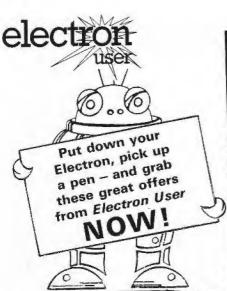
20780 DATA bed, M, 150, 50, B, 1 58, 120, M, 150, 108, D, 350, 100, D, 350, 75, D, 150, 75, M, 350, 58, D, 350, 140, \*

28718 DATA nightshirt, M, 288, 18,0,328,18,0,338,115,0,32 5,88,0,358,188,0,388,115,0,32 5,88,0,358,188,0,388,158,0, 5,28,158,0,158,188,0,238,158,0, 1,288,158,0,158,188,0,288,188,0,288,115,0,288,118,288,118,0,288,118,

28728 DATA pillom,E,258,188,158,58,1.1,2.2,E,258,188,1.58,58,4.2,5.3,m,175,68,D,175,148,M,325,68,D,325,148,\*
29999 DATA \*

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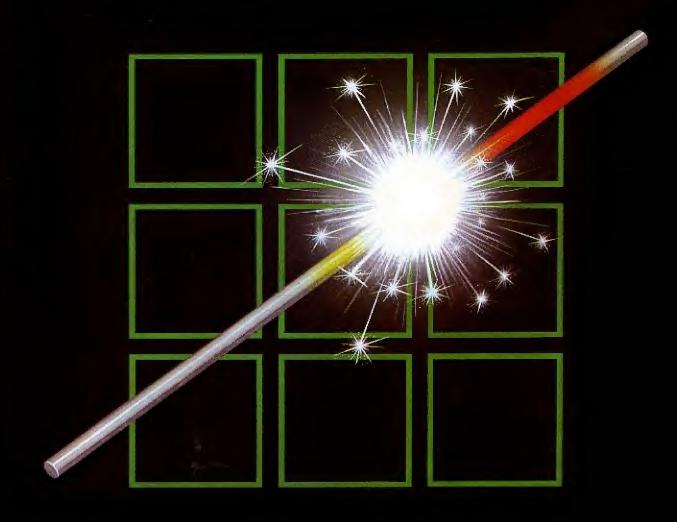
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